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NATIONAL FUEL ALCOHOL AND FARM COMMODITY PRODUCTION ACT OF 1979

96-1

HEARINGS

BEFORE THE

SUBCOMMITTEES ON CONSERVATION AND CREDIT, DEPARTMENT INVESTIGATIONS, OVERSIGHT, AND RESEARCH,

AND

LIVESTOCK AND GRAINS

OF THE

COMMITTEE ON AGRICULTURE HOUSE OF REPRESENTATIVES

NINETY-SIXTH CONGRESS

FIRST SESSION

ON

H.R. 3905

MAY 15 AND 16, 1979

(J)

Serial No. 96-J

Printed for the use of the Committee on Agriculture

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CONTENTS

MAY 15, 1979

Page

H.R. 3905, a bill to authorize the Secretary of Agriculture to guarantee loans for the construction and operation of alcohol fuel plants, to provide for the sale of agricultural commodities for the operation of such plants, to amend the Agricultural Act of 1949 with respect to the set-aside program for feed grains, and for other purposes 2
Bedell, Hon. Berkley, a Representative in Congress from the State of Iowa, opening remarks 20
de la Garza, Hon. E, a Representative in Congress from the State of Texas, opening remarks 21

WITNESSES

Albright, Darold E., executive director, International Biomass Institute, Washington, D.C 162
Blaser, Richard F., director, International Biomass Institute, Washington, D.C 148
Calvert, Victoria R., director, Federal Energy Affairs, National Council of Farmer Cooperatives 187
Crombie, Lance, Webster, Minn 158
Dodd, Harold, president, Illinois Farmers Union 121
Dover, Harold, State Senator, State of Montana 208
Fogde, Clinton A., petroleum division planner and director of technical services, Land O'Lakes, Inc 191
Hagedorn, Hon. Tom, a Representative in Congress from the State of Minnesota 79
Hodge, Holly, president, National Gasohol Commission, Inc 200
Jawetz, Pincas, independent consultant of energy policy, New York, N.Y 98
Kelley, Don, Jay County Farm Bureau Cooperative Association, Inc., Portland, Ind 134
Lamm, Warren W., executive director, Committee on Agriculture and Rural Affairs, Pennsylvania House of Representatives 139
Lutz, Donald E., farmer, Mohrsville, Pa 91
Majors, Betty, national president, Women Involved in Farm Economics 88
Middaugh, Paul, professor of microbiology, South Dakota State University, Brookings, S. Dak 142
Muller, Werner O., vice president, U.S. Industrial Chemicals Co., division of National Distillers & Chemical Corp 215
Oxton, Neil, president, Nebraska Farmers Union 119
Rasmussen, Ross, member, National Gasohol Commission, Hooper, Nebr 206
Sampson, Neil, executive vice president, National Association of Conservation Districts 109
Scheller, William A., professor of chemical engineering, University of Nebraska, Lincoln, Nebr 203
Schrawder, Larry, Berks County, Pa., Chapter, Future Farmers of America 93
Smith, Hon. Virginia, a Representative in Congress from the State of Nebraska. 86
Sorteberg, Curt, assistant to the president, Iowa Farmers Union 123
Williams, James, Deputy Secretary, U.S. Department of Agriculture 22

MATERIAL SUBMITTED

Lyon, Dale, president, Kansas Farmers Union 129
Miller, Hon. Clarence E., a Representative in Congress from the State of Ohio 223

Digitized by Google

MAY 16, 1979

WITNESSES

Page

Abdnor, Hon. James, a Representative in Congress from the State of South Dakota 267
Alm, Alvin L., Assistant Secretary for Policy and Evaluation, U.S. Department of Energy 225
Barber, Roger, president, Northern Agri-Fuels, Inc., Rapid City, S. Dak 269
Bernton, Hal, staff reporter for Jack Anderson, syndicated columnist 336
Brown, Harry, Office of Energy, U.S. Department of Agriculture 308
Connors, Jerry C., managing director, Government Affairs, American Automobile Association 320
Cray, Cloud L., Jr., president, Midwest Solvents Co., Inc., Atchison, Kans 295
Drennan, Jane, attorney, McDermott, Will & Emory, Washington, D.C 347
Griner, James T., farmer, Nashville, Ga 318
Hayenga, Melvin K., executive vice president, National Corn Growers Association, Des Moines, Iowa 357
Heffernan, Keith, executive director, Iowa Corn Growers Association 358
Loser, René F., chief executive officer, Chemapec, Inc., Woodbury, N.Y 289
Lyon, Harry B., American Society of Petroleum Operations Engineers, Alexandria, Va 310
Mavis, Al, farm energy conservation coordinator, Illinois Department of Agriculture 325
Patterson, Don, American Agriculture Movement of Virginia, The Plains, Va 359
Shellito, Gale, president, Solar Fuels, Inc., Rapid City, S. Dak 264
Soleta, William R., administrator, National Gasohol Commission, Inc 339
Tsao, George T., director, laboratory of renewable resources engineering, Purdue University 273

MATERIAL SUBMITTED

Andrews, Hon. Mark, a Representative in Congress from the State of North Dakota 374
Luken, Hon. Thomas A., a Representative in Congress from the State of Ohio 376
Schmit, Loran, Nebraska State Senator 380
Bucha, Paul A., Land Improvement Contractors of America 383
Collins, Lewis B., Camilla, Ga 387
Condon, Eddie, Barnum, Iowa 395
Demmel, Dennis, small farm energy project, Center for Rural Affairs, Hartington, Nebr 406
National Farmers Organization 400
National Society of Professional Engineers 404
Reeser, Lloyd, chairman, Gasohol Committee, American Agriculture of Illinois 398

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NATIONAL FUEL ALCOHOL AND FARM COMMODITY PRODUCTION ACT OF 1979

TUESDAY, MAY 15, 1979

HOUSE OF REPRESENTATIVES, SUBCOMMITTEES ON CONSERVATION AND CREDIT, DEPARTMENT INVESTIGATIONS, OVERSIGHT, AND RESEARCH, AND LIVESTOCK AND GRAINS OF THE COMMITTEE ON AGRICULTURE,

Washington, D.C.

The subcommittees met, pursuant to recess, at 10 a.m., in room 1301, Longworth House Office Building, Hon. Charles Rose (chairman of the Subcommittee on Livestock and Grains) presiding.

Present: Representatives de la Garza, Baldus, Harkin, Bedell, Fithian, Glickman, Daschle, Hance, Stenholm, Sebelius, Symms, Heckler, Jeffords, Kelly, Grassley, and Hagedorn.

Also present: Representative Findley, member of the full committee.

Staff present: Fowler C. West, staff director; Peggy Pecore, clerk; Anita Brown, Humberto Pena, Gary Norton, Claude Freeman, Gerald R. Jorgensen, and Bernard Brenner.

Mr. ROSE. The subcommittees will be in order.

The purpose of today's hearing is to consider H.R. 3905, introduced by Congressman Bedell of Iowa, entitled "The National Fuel Alcohol and Farm Commodity Production Act of 1979."

[The bill, H.R. 3905 follows:]

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I

96TH CONGRESS
1ST SESSION

H. R. 3905

To authorize the Secretary of Agriculture to guarantee loans for the construction and operation of alcohol fuel plants, to provide for the sale of agricultural commodities for the operation of such plants, to amend the Agricultural Act of 1949 with respect to the set-aside program for feed grains, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES

MAY 3, 1979

Mr. BEDELL introduced the following bill; which was referred to the Committee on Agriculture

---

A BILL

To authorize the Secretary of Agriculture to guarantee loans for the construction and operation of alcohol fuel plants, to provide for the sale of agricultural commodities for the operation of such plants, to amend the Agricultural Act of 1949 with respect to the set-aside program for feed grains, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

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SHORT TITLE

SECTION 1. This Act may be cited as the "National Alcohol Fuel and Farm Commodity Production Act of 1979.".

STATEMENT OF PURPOSE

SEC. 2. The purposes of this Act are—

(1) to contribute toward the development of a secure liquid fuel supply in the United States by providing the foundation for a viable alcohol fuel industry;

(2) to increase the security and enhance the economic health of the United States;

(3) to improve and stabilize agricultural income and reduce the role of the Federal Government in agricultural commodity price support programs; and

(4) to establish a mechanism for implementing improved natural resource practices on a broad scale.

ALCOHOL FUEL PLANT LOAN GUARANTEES

SEC. 3. Section 509 of the Rural Development Act of 1972 (7 U.S.C. 2669) is amended to read as follows:

"SEC. 509. ALCOHOL FUEL PLANT LOAN GUARANTEES.—"(a) In order to assist persons, including any public, private, or cooperative organization, in the construction and maintenance of plants for the production of alcohol fuel derived from agricultural commodities and other renewable resources and for purposes of stabilizing and expanding the

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market for such agricultural commodities and other renewable resources and expanding the Nation's supply of alcohol fuels, the Secretary is authorized—

"(1) to guarantee payment of 50 per centum of the principal of and interest on loans made by private lenders to such persons for the construction and operation of alcohol fuel plants;

"(2) to sell agricultural commodities to recipients of loans guaranteed under this section and to other persons operating alcohol fuel plants in accordance with subsection (e);

"(3) to acquire and use distiller's dried grains plus solubles (hereafter in this section referred to as 'DDGS') in accordance with subsection (f); and

"(4) to make such regulations, enter such contracts, and take such other actions as may be necessary to carry out this section.

"(b) No loan may be guaranteed under this section unless an application therefor has been submitted to and approved by the Secretary. Such application shall be submitted in such form and according to such procedures as the Secretary may require by regulation. Such application shall contain—

"(1) assurances by the applicant that any loan guaranteed under this section shall be used for the con-

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struction and operation of plants for the production of alcohol fuel from agricultural commodities;

"(2) information concerning the total cost of the construction of the plant for which such loan is sought, estimates of the operating costs and income to be derived from the operation of such plant, and any other financial information the Secretary may require;

"(3) assurances that the applicant will keep such records and afford such access thereto, and make such reports, in such form, at such times, and containing such information, as the Secretary may require by regulation; and

"(4) such other information or assurances as the Secretary may require.

"(c) A loan may be guaranteed under this section only if—

"(1) such loan is for a term not in excess of twenty years;

"(2) the Secretary determines that the terms, conditions, maturity, security (if any), and schedule and amounts of repayments with respect to such loan are reasonable and meet such standards as the Secretary determines by regulation as sufficient to protect the financial interests of the United States, taking into account the range of interest rates prevailing in the pri-

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vate market for similar loans guaranteed by the United States;

"(3) the Secretary determines that the applicant is unable without a guarantee under this section to obtain sufficient credit elsewhere to finance the construction and operation of the plant for which such loan is sought at reasonable rates and terms, taking into consideration prevailing private and cooperative rates and terms for loans for similar purposes and periods of time;

"(4) the applicant for such loan guarantee demonstrates to the satisfaction of the Secretary that such applicant has taken steps to ensure that the total energy content of the alcohol fuel manufactured by such applicant will exceed the total energy input from petroleum or petroleum-based products used directly in the manufacture of such alcohol fuel and DDGS;

"(5) such applicant will pay to the Secretary one cent per gallon of alcohol fuel produced at such plant; and

"(6) such other conditions as the Secretary deems appropriate to achieve the purposes of this section and to protect the financial interests of the United States are met.

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"(d) For the period beginning on October 1, 1979, and ending on September 30, 1984, the cumulative total of the principal of and interest on loans outstanding at any time guaranteed under this section shall not exceed $600,000,000.

"(e)(1) In order to assure that the recipients of loans for plants guaranteed under this section and other persons operating plants for the production of alcohol fuel have a dependable supply of agricultural commodities at a stable price for use in such plants, the Secretary is authorized to enter into long-term sales contracts, not exceeding five years, with such recipients and such other persons to sell annually to such recipients and such other persons a specified quantity of agricultural commodities upon specified terms of delivery and—

"(A) for the period beginning on October 1, 1979, and ending on January 1, 1982, at a price upon which the Secretary and the buyer of such agricultural commodities mutually agree; and

"(B) after January 1, 1982—

"(i) at a price which is equal to 80 per centum of the established price in effect for such agricultural commodity for the crop year in which such agricultural commodity was produced; or

"(ii) if no such established price is in effect for such agricultural commodity for the crop year in which such agricultural commodity was pro-

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duced, at a price upon which the Secretary and the buyer of such agricultural commodities mutually agree.

"(2) Any contract for the sale of any agricultural commodities to any buyer under this subsection shall provide—

"(A) that such buyer, except persons receiving loan guarantees under this section, will pay to the Secretary one cent per gallon of alcohol fuel produced from such agricultural commodities;

"(B) that such agricultural commodities shall be used primarily for the production of alcohol fuel;

"(C) that alcohol fuel derived from such agricultural commodities will be produced for use as fuel; and

"(D) that such buyer shall make available to the Secretary at a mutually agreed upon price such amounts of DDGS produced from such agricultural commodities as the Secretary may request.

"(3) Any DDGS acquired by the Secretary under this section shall become a part of the stocks of agricultural commodities of the Commodity Credit Corporation.

"(4) The Secretary shall make available such amounts of agricultural commodities as may be necessary to meet obligations under contracts entered into under this subsection.

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"(f)(1) The Secretary may acquire under subsection (e)(2)(D) and use such amounts of DDGS as may be necessary—

"(A) to maintain a reserve of DDGS for purposes of meeting obligations of the Secretary for export of agricultural commodities; and

"(B) for such other purposes consistent with this subsection as the Secretary may determine.

"(2) The Secretary shall acquire under subsection (e)(2)(D) and use such amounts of DDGS as may be necessary to assure the orderly marketing of such DDGS, soybeans, and other agricultural commodities used in the production of protein supplements.

"(g)(1) For purposes of complying with contracts entered into under subsection (e), the Secretary shall supply agricultural commodities from Commodity Credit Corporation stocks and from agricultural commodities purchased by the Secretary from producers participating in the producer storage program under section 110.

"(2) If the Secretary is unable to supply a sufficient amount of agricultural commodities under paragraph (1) to meet obligations under contracts entered into under subsection (e), he shall purchase from domestic producers such amounts of agricultural commodities as may be necessary to meet such obligations under such contracts.

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"(h)(1) There is established in the Treasury of the United States a revolving fund to be called the Alcohol Fuel Plant Loan Guarantee Fund (hereafter in this section referred to as the 'Fund') which, to the extent provided in advance by appropriation Acts, shall be available to the Secretary without fiscal year limitation to carry out the purposes of this section.

"(2) There shall be deposited in the Fund—

"(A) amounts received pursuant to subsections (c)(5) and (e)(2)(A);

"(B) amounts appropriated for use by the Secretary to carry out this section; and

"(C) interest which may be earned on investments of the Fund.

"(3) If the Secretary determines that the moneys of the Fund are in excess of current needs, he may request the investment of such amounts he deems advisable by the Secretary of the Treasury in obligations of, or obligations guaranteed by, the Government of the United States, and, with the approval of the Secretary of the Treasury, in such other obligations or securities as the Secretary deems appropriate.

"(4) With the approval of the Secretary of the Treasury, the Secretary may deposit moneys of the Fund in any Federal Reserve bank, any depository for public funds, or in such

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other places and in such manner as the Secretary and the Secretary of the Treasury may mutually agree.

"(5) Effective for the fiscal year ending on September 30, 1980, there is authorized to be appropriated $60,000,000 for deposit in the Fund.

"(i)(1) Subsections (a), (b), (c), and (d) of this section shall be carried out by the Secretary through the Farmers Home Administration.

"(2) Subsections (e), (f), and (g) of this section shall be carried out by the Secretary through the Commodity Credit Corporation.

"(j) For purposes of this section—

"(1) the term 'distiller's dried grains plus solubles' means the by-product of the fermentation process in the production of alcohol fuels which contains digestible protein and which can be made suitable for human and animal consumption; and

"(2) the term 'alcohol fuel' means the chemical compound represented by the following formula: C_2H_5OH.".

AMENDMENTS TO THE AGRICULTURAL ACT OF 1949

SEC. 4. Section 105 of the Agricultural Act of 1949 (7 U.S.C. 1444b) is amended to read as follows:

"FEED GRAIN LOAN RATES AND TARGET PRICES

"SEC. 105. Notwithstanding any other provision of law:

47-077 O - 79 - 2

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"(a)(1) The Secretary shall make available to producers on farms loans and purchases for each crop of corn at such level, not less than $2.10 per bushel, as the Secretary determines will allow for the export of feed grains and provide a sufficient stock of feed grains for the production of alcohol fuel but will not result in an excessive stock of feed grains in the United States.

"(2) The Secretary shall make available to producers on farms loans and purchases on each crop of barley, oats, and rye, respectively, at such level as the Secretary determines is fair and reasonable in relation to the level that loans and purchases are made available for corn, taking into consideration the value of such commodity in relation to corn and other factors specified in section 401(b) of this Act, and on each crop of grain sorghums at such level as the Secretary determines is fair and reasonable in relation to the level that loans and purchases are made available for corn, taking into consideration the value and average transportation costs to market of grain sorghums in relation to corn.

"(b)(1)(A) In addition, the Secretary shall make available to producers on farms payments for each crop of corn, grain sorghums, and, if designated by the Secretary, oats and barley, in an amount computed as provided in this subsection. Payments for any crop shall be computed by multiplying (i)

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the payment rate for such crop by (ii) the number of bushels of such crop produced on the farm.

"(B)(i) The payment rate for corn shall be the amount by which the higher of—

"(I) the weighted average market price received by farmers during the first five months of the marketing year for such crop in the States in which such corn is produced, as determined by the Secretary, or

"(II) the loan level determined under subsection (a) for such crop,

is less than the established price per bushel.

"(ii) For purposes of clause (i), the established price for corn shall be $2.75 per bushel in the case of the 1982 crop. For each crop thereafter, the established price shall be the established price for the previous year's crop adjusted to reflect any change in (I) the average adjusted cost of production for the two crop years immediately preceding the year for which the determination is made from (II) the average adjusted cost of production for the two crop years immediately preceding the year previous to the year for which such determination is made.

"(iii) The adjusted cost of production for a crop year shall be determined by the Secretary on the basis of such information as the Secretary finds necessary and appropriate for the purpose and shall be limited to (I) variable costs, (II)

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machinery ownership costs, and (III) general farm overhead costs, allocated to the crops involved on the basis of the proportion of the value of the total production derived from each crop.

"(C) The payment rate for sorghums, and, if designated by the Secretary, oats and barley, shall be such rate as the Secretary determines fair and reasonable in relation to the rate at which payments are made available for corn.

"(D) The total number of bushels on which payments would otherwise be payable to producers on farms for any crop under this paragraph shall be reduced by the number of bushels on which any disaster payment is made to such producers for such crop under paragraph (2) of this subsection.

"(2)(A) If the Secretary determines that because of drought, flood, or other natural disaster, or other condition beyond the control of producers on farms, such producers are prevented from planting to feed grains or other nonconserving crops any acreage intended for feed grains, the Secretary shall make a prevented planting disaster payment to such producers on the number of acres so affected. The amount of any prevented planting disaster payment to producer on farms shall not exceed an amount computed by multiplying (i) 33⅓ per centum of the established price per bushel for feed grains by (ii) 75 per centum of the farm program payment yield for feed grains established by the Secretary for the

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acreage planted by such producer to feed grains for harvest (including any acreage which the producers were prevented from planting to feed grains or other nonconserving crop in lieu of feed grains because of drought, flood, or other natural disaster, or other condition beyond the control of the producers) in the immediately preceding year.

"(B) If the Secretary determines that because of drought, flood, or other natural disaster, or other condition beyond the control of producers on farms, the total number of bushels of any crop of feed grains harvested by such producers from acreage planted to such crop on any farm is less 60 per centum of the farm program payment yield established by the Secretary for such crop for such acreage, the Secretary shall make a farm disaster payment to such producers in an amount equal to 50 per centum of the established price per bushel for each bushel by which such 60 per centum exceeds the actual number of bushels harvested from such acreage.

"(c) The Secretary shall provide for the sharing of payments made under this section for any farm among producers on such farm on a fair and equitable basis.

"(d) If the operator of a farm desires to participate in the program under this section, the operator shall file an agreement to do so no later than such date as the Secretary may prescribe. Loans, purchases, and payments under this

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section shall be made available to producers on such farm only if—

"(1) the producers agree to devote and devote the total acreage of such farm to approved soil conserving uses and best management practices as the Secretary shall prescribe; and

"(2) the producers agree to sell to the Secretary after harvest no less than 10 per centum of any crop of corn produced on such farm in any crop year at the established price for such crop for such crop year.

The Secretary may, by mutual agreement with the producers, terminate or modify any agreement entered into pursuant to this subsection if the Secretary determines that such action is necessary because of an emergency created by drought or other disaster, or in order to prevent or alleviate a shortage in the supply of agricultural commodities.

"(e) In any case in which the failure of a producer to comply fully with the terms and conditions of the program under this section precludes the making of loans, purchases, and payments, the Secretary may, nevertheless, make such loans, purchases, and payments in such amounts as the Secretary determines to be equitable in relation to the seriousness of the default.

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"(f) The Secretary is authorized to issue such regulations as the Secretary determines necessary to carry out this section.

"(g) The Secretary shall carry out the program authorized by this section through the Commodity Credit Corporation.".

CONFORMING AMENDMENTS

SEC. 5. (a) Section 110(b) of the Agricultural Act of 1949 (7 U.S.C.1445e(b)) is amended by striking out "and (6)" and inserting in lieu thereof "(6)" and by inserting before the period the following new clause: "; and (7) conditions under which the Secretary may require agreements by producers of agricultural commodities to sell agricultural commodities stored under the program to the Secretary in such amounts as the Secretary may require for purposes of contracts under section 509(e) of the Rural Development Act of 1972 (A) at the established price in effect for such agricultural commodity for the crop year in which such agricultural commodity was produced, or (B) if no such established price is in effect for such agricultural commodity for the crop year in which such agricultural commodity was produced, at a price upon which the Secretary and such producers mutually agree.".

(b) Section 110(d)(2) of the Agricultural Act of 1949 (7 U.S.C. 1445e(d)(2)) is amended by striking out "and (C)" and

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inserting in lieu thereof ", (C)" and by inserting before the period the following new subclause: ", and (D) section 509(e) of the Rural Development Act of 1972".

(c) Section 407 of the Agricultural Act of 1949 (7 U.S.C. 1427) is amended by inserting "(a)" after "SEC. 407." and by adding at the end of such section the following new subsection:

"(b) Notwithstanding subsection (a), for purposes of meeting obligations of the Secretary under contracts entered into under section 509(e) of the Rural Development Act of 1972, the Commodity Credit Corporation may sell any agricultural commodity owned or controlled by it—

"(1) during the period beginning on October 1, 1979, and ending on January 1, 1982, at the price upon which the Secretary and the buyer of such agricultural commodities mutually agree; and

"(2) after January 1, 1982—

"(A) at a price which is equal to 80 per centum of the established price in effect for such agricultural commodity for the crop year in which such agricultural commodity was produced; or

"(B) if no such established price is in effect for such agricultural commodity for the crop year in which such agricultural commodity was produced, at a price upon which the Secretary and

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the buyer of such agricultural commodities mutually agree.".

STUDY ON USES AND MARKETING OF BYPRODUCTS RESULTING FROM PRODUCTION OF ALCOHOL FUEL

SEC. 6. Not later than eighteen months after the date of the enactment of this Act, the Secretary of Agriculture shall complete a study of the uses and marketing of the byproducts resulting from the production of alcohol fuel and shall submit to the Committee on Agriculture of the House of Representatives and the Committee on Agriculture, Nutrition, and Forestry of the Senate a written report which contains (1) the findings of such study, and (2) if appropriate, a market promotion program identifying the foreign markets for such byproducts for human consumption, including recommendations for expanding such foreign markets. In conducting such study, the Secretary of Agriculture shall consult with and, wherever practicable, use the resources of the National Alcohol Fuels Commission.

EFFECTIVE DATE PROVISIONS

SEC. 7. (a) The amendments made by sections 3 and 5 of this Act shall take effect on October 1, 1979.

(b) The amendments made by section 4 of this Act shall be effective beginning with the 1982 crop of feed grains.

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Mr. ROSE. Before we hear from the Department witnesses, I would like to yield to Congressman Bedell for an opening statement.

OPENING REMARKS OF HON. BERKLEY BEDELL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF IOWA

Mr. BEDELL. Thank you, Mr. Chairman. I appreciate this opportunity to say a few words about the subject of these hearings for the next few days—the production of alcohol fuels from agricultural commodities and other renewable resources. The chairmen of the three subcommittees here today are to be commended for their willingness to make time in the committee's busy schedule to hear testimony which, I am confident, will underscore the need for some basic changes in our current agricultural and energy policies.

My statement will be very brief and without any specific references to provisions of my legislation, primarily because I believe that the time will be better spent hearing from the many experts who are scheduled to testify today and tomorrow. However, I would like to make just one broad observation.

I have spent the past few months since the initial introduction of my proposal talking to hundreds of farmers, technicians, and academicians about the subject of alcohol fuel production from renewable resources. We have discussed everything from the economics of ethanol production, to the net energy balance that can be expected, to the relative feeding efficiencies of the byproduct of the conversion process.

Throughout these discussions, one message stands out loud and clear—that there are those in official Washington who are captives of their own predilictions and are accepting without question the testimony of the so-called experts who tell us why it cannot be done.

And while these experts are telling us that some of these advances are not possible, the people back home who are tired of insufficient outlets for their agricultural commodities and who are not prepared to accept as inevitable standing in hour-long lines of $1 gasoline are going ahead and experimenting with the production of alcohol fuels from renewable resources.

I think that this point is highly significant. It seems to me that this "can-do" attitude is what has made this country what it is today. If we had always waited until the Government experts gave their approval, many of our national challenges would have gone unanswered. These hearings will demonstrate that the grassroots reaction to alcohol fuels production has been nothing short of explosive, and that some very positive things can happen if the Federal Government will only attempt to remove some of the barriers that have so far been holding it back.

Events of the last several months offer irrefutable proof of the need for, and the suitability of, alcohol produced from renewable resources for fuel purposes. The question before us today, I believe, is not if we should produce alcohol, but how.

Mr. Chairman, I believe that, by the end of these hearings, all of my colleagues will share to some degree the feeling I have after talking with so many of the people in this country who are making it happen. If we begin to work as hard at finding the solutions to

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some of the few problems that still remain in the area of alcohol fuels production as we have been working at identifying those problems, we will be well on the way to energy independence in this country.

It is not a panacea, but it is a positive expression of American determination and resolve to solve its own problems. I believe it is high time that we accept that challenge.

Thank you.

Mr. ROSE. Mr. Bedell, we thank you.

The vice chairman of the House Agriculture Committee and 1 of the 3 chairmen who are involved in this hearing today, Congressman de la Garza of Texas, may want to have a comment.

Mr. DE LA GARZA. Thank you, Mr. Chairman.

OPENING REMARKS OF HON. E DE LA GARZA, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF TEXAS

Mr. DE LA GARZA. Agriculture can play a great part in the future as we look to alternate sources of energy.

I would like, however, to make some points so that we do not get completely carried away with the idea, No. 1, that this is a new and innovative area.

Methanol from grain as an automotive fuel is not a new idea. During the 1930's grain alcohol was used in this way in a number of countries where petroleum was in short supply or where the economic depression had left farmers without money to buy gasoline.

This also occurred on a small scale in some of the grain belt States in the United States.

During World War II this practice was continued and even extended as the disruption caused by the war led to gasoline shortages around the world. Not only alcohol but other substances such as wood, charcoal, cow manure, and the like were used in many areas.

All of us know that just about from any source that you can find on your farm you can produce alcohol from it, including dandelions.

I have drunk a goodly share of that product. Maybe it wasn't a goodly share but at least a taste of it. [Laughter.]

The possibility of using grain alcohol as an automotive fuel was reviewed periodically during the fifties and the sixties when the intent was to dispose of the enormous grain surpluses then existing, so we continue now with that interest in mind.

Now, the idea never progressed beyond the discussion stage inasmuch as ethanol could not compete economically with gasoline. All of us remember that at that time we were getting crude oil from other areas of the world for from anywhere between $1 to $3 a barrel.

There is no major past history of methanol being used as an automotive fuel but during World War II Germany ran its war machine in the latter months of the war on fuels derived from coal after its oil supply was cut off.

However, they converted the coal to gasoline and not to methanol. Wood was used as the source of the automotive fuel in some countries during that time, but the wood was burned directly and

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not converted to methanol as it was used in the steam engines where they used the wood to make the steam.

There is some experience in Brazil at which we have taken a look. I think we should continue to look at it. There are some questions yet to be answered.

However, all in all, Mr. Chairman, I think it is worthwhile and well that we direct our attention to all of the possibilities that exist. I share the enthusiasm of my colleague from Iowa that all of our minds need to be addressed to the possibility.

My only concern is this. I want to utter a word of caution. As for the future, we of course have to look at alternate sources of energy, but I do not think that we should get carried away to the effect that it is a new and innovative process. It is not.

I do not think that we need to think that it will replace the hydrocarbon energy supply. It cannot. However, it can be an addition to what we have and that is the area that we must address ourselves to. It can be an addition to the sources we now have and an alternative source in conjunction with other sources. I think if we address that question we would have done our share to help minimize the effects of the shortages of petroleum products.

Thank you, Mr. Chairman.

Mr. ROSE. Thank you, Mr. de la Garza.

Let me welcome now the Deputy Secretary of Agriculture, Mr. James Williams. He is accompanied by Dr. Weldon Barton, Director of the Department of Energy, U.S. Department of Agriculture.

Mr. Williams, we have until about noon to take care of our witnesses this morning. We would like very much to hear from you in any degree of detail that you are willing to give us. You may proceed.

STATEMENT OF JAMES WILLIAMS, DEPUTY SECRETARY, U.S. DEPARTMENT OF AGRICULTURE, ACCOMPANIED BY WELDON BARTON, DIRECTOR, OFFICE OF ENERGY

Mr. WILLIAMS. Thank you, Mr. Chairman.

First, I want to let Congressman Bedell know that we are here this morning principally because of his bill, but I would also like to share with the committees, that I did meet with Congressman Bedell last week. We were looking at some things together. I am going to supply for the committee a report that we have from the Science and Education Administration on specific projects that have been under study in the whole area of gasohoi which deal with distillers' grains and a number of other things.

There is another rather voluminous group of papers which pretty much will highlight for Mr. Bedell and the committees the research that we have today going on in this area.

Mr. ROSE. Without objection, the record will remain open at this point for the purpose of inserting this additional material.

[The above referrred to material appears on p. 26.]

Mr. WILLIAMS. We are here in a positive vein to try and figure out what is the right approach and to support in every way we can the efforts of Congressman Bedell to see that this does, in fact, move ahead.

I apologize that the Secretary is unable to be here today. He got back in town late last night and is leaving again right away. His

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father has been hospitalized in Minnesota. Unfortunately, he is in a rather grave condition. The Secretary will be away the rest of the week.

It is a pleasure to appear before you today on H.R. 3905, a bill designed to encourage production of fuel-grade ethanol from agricultural commodities.

The production of grain alcohol for motor fuel involves a number of complex issues and has important implications for the farm sector and for food and agricultural policy. To improve our understanding of these matters, the Secretary directed USDA staff on March 20 of this year to review the alcohol fuels situation once again, seeking the best advice available inside and outside government.

We asked that this review be conducted with a positive perspective on the potential of alcohol fuel for contributing to solutions to our energy problems. We also asked that the implications of alternative alcohol fuels policy options for the agricultural and consumer sectors be carefully assessed. A copy of this review is attached to this statement.

Mr. ROSE. Without objection, a copy of the review referred to will be inserted in the record at this point.

[The above referred to material appears on p. 33.]

Mr. WILLIAMS. Mr. Chairman, as you know, the President announced in Des Moines, Iowa, on April 5, 1979, that the administration will support extension of the 4 cents per gallon excise tax exemption on gasohol beyond its October 1, 1984, expiration date. This provides a very powerful financial incentive of 40 cents per gallon on gasohol. The Department of Agriculture, of course, fully supports the President's initiative on gasohol, and I would like briefly to review several actions that USDA has taken or is taking specifically in support of gasohol.

First: The Department is assisting pilot projects for fuel-grade ethanol production under section 1420 of the Food and Agricultural Act of 1977. USDA has made tentative commitments on $42.7 million on loan guarantees, which will assist in financing four pilot projects to convert agricultural and forestry commodities into energy.

Two of these projects will produce fuel-grade ethanol. One is designed to produce ethanol out of cellulose materials from sugar cane, using a new conversion technology. The other will demonstrate the commercial use of sweet sorghum as a feedstock for ethanol production.

Together, these two projects, involving $30 million in government loan guarantees, should assist significantly in the development and testing of new technologies and feedstocks for the production of fuel-grade alcohol.

Second: The Department is greatly expanding its research and development work on alcohol fuels. For fiscal year 1980, we are programing almost $6 million of Department of Agriculture funds for this work. About $3.9 million of this is programed for the field testing of new crop varieties suitable for use as ethanol feedstocks and for the development of more efficient methods to convert agricultural materials into ethanol. An additional $2 million is pro-

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gramed for design work on small-scale, on-farm technologies for producing alcohol fuel and combustible methane.

The Department of Energy also has increased its funding for alcohol fuels substantially for fiscal year, to $23 million.

Third: The Congress in title II of the Emergency Agriculture Act of 1978 authorized the Secretary of Agriculture to scale back, or use, set-aside acreage in order to make land available to grow crops for use in the manufacture of fuel ethanol. I intend to use that authority to the full extent that there is a demonstrated market demand for additional production to provide feedstock to alcohol distilleries.

The need for agricultural commodities for fuel alcohol feedstocks will be fully taken into account in our decisions on set-aside acreage, so that insofar as possible we will make sure that feedstock availability is not a delaying factor in the production of alcohol fuels.

Fourth: I am also prepared to take fully into account the feedstock requirements of fuel alcohol distilleries in determining and maintaining the proper level of grain reserves. The fluctuations in grain supplies and prices will be a problem for alcohol distilleries throughout the life of the distillation plants. Our grain reserve policy can accommodate grain alcohol production for fuels by providing a measure of year-to-year stabilization of grain feedstock supplies and costs. If the reserve availability is then supplemented with hedging practices by the distilleries, probably this will provide the most effective support to gasohol, from the grain feedstock perspective, that is possible under the circumstances.

In sum, the Department of Agriculture intends to take constructive action to try to make sure that land and feedstocks are available to support fuel alcohol production. Congress, in our view, has provided sufficient authority in the 1977 and 1979 Agriculture Acts to enable the USDA to meet those responsibilities.

Mr. Chairman, with respect to H.R. 3905 which is before the committee, I will not go into detail in this prepared statement.

It is incumbent upon all of us to make sure that, in considering ways to develop gasohol, we do not make changes in agricultural policy that might prove counterproductive to farm producers or other segments of the economy. For that reason, if additional legislation seems to be necessary other than the existing 4 cents tax waiver, the 20-percent investment tax credit which will soon be available to fuel alcohol distilleries, and the legislation on grain reserves and usage of set-aside acreage referred to above, we would like to work with the committee and the Congress in that regard.

By working together, perhaps we can realize the potential for production of alcohol fuels from agricultural materials in ways that are sensible from both energy and agriculture perspectives.

I personally visited the Archer Daniels' Midland plant in Decatur, Ill., in order to see first hand the largest fuel ethanol production facility in the United States. This is a new, modern plant, which makes use of fuel-saving technology and a product mix which enhances the economics of the operation.

I also asked the staff of the Department of Agriculture to prepare certain additional materials on distillers dried grains and other byproducts of ethanol production and on other source materi-

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als on fuel ethanol production. These materials are provided for the record.

Mr. Chairman, this concludes my statement. I will be happy to respond to any questions.

[Background papers on "Information on Alcohol Fuels and Distillers Dried Grain" are held in the subcommittees' files. Other previously referred to material follows:]

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.. Grains and Sugar Crops

There have been three major studies dealing with ethanol production from grains. Although corn, wheat, and grain sorghum have been considered in several analyses using grain as the feedstock, corn has been given the greatest attention because of price, supply and conversion efficiency considerations. Three high-sugar crops have been investigated: sugarbeets, sugarcane, and sweet sorghum. In general, these are high cost alternatives to corn. One major study has examined the use of sugar crops as feedstock for ethanol production. The principle findings of these reports are summarized below.

1. Litterman, Mary, et. al., Economics of Gasohol, ER 78-10, Department of Agriculture and Applied Economics, University of Minnesota, St. Paul., Minnesota, December, 1978.

The feasibility of producing ethanol from corn is investigated. The analysis shows the production of ethanol from corn to be energy inefficient, resulting in a net loss of between 78,000 and 113,000 Btu's per gallon of ethanol, or an energy efficiency ratio of between .64 and .43. The costs of gasohol exceed gasoline price by about 9 cents per gallon, excluding State and Federal subsidies.

2. Kendrick, James G. and Pamela J. Murray, Grain Alcohol in Motor Fuels- an Evaluation, Report No. 81, Agricultural Experiment Station, University of Nebraska, Lincoln, Nebraska, April, 1978.

The net energy balance and costs of production are analyzed. The energy efficiency calculations show ethanol production from corn to result in a net loss of 145,000 Btu's/gallon of ethanol. Total ethanol costs are $1.25 per

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gallon, and gasohol is between $.09 and $.10 more expensive than unleaded gasoline.

3. Raphael Katzen Associates, Grain Motor Fuel Alcohol Technical and Economic Assessment Study. Prepared for Department of Energy, Washington, D.C. December, 1978.

This report evaluates the technical and economic feasibility of a 50 million gallon per year ethanol plant utilizing the most advanced fermentation and distillation processes which have been proved on a commercial basis. The selling price for ethanol would be between $1.05 and $1.13 per gallon. Economies of scale are investigated and a price of $.98 per gallon is calculated for a 100 million gallon per year plant. Prices using alternative feedstocks are as follows (assuming 50 million gallon plants): sweet sorghum- $1.05 to $1.40 per gallon; grain sorghum - $1.02 per gallon; wheat - $1.31/ gallon. The energy efficiency ratio of ethanol production from corn is shown to be 1.05 Btu's of ethanol per Btu consumed. The report also includes a commentary on the agricultural, technological and economic impact of a major gasohol program in the United States.

4. Midwest-Research Institute, Availability and Cost of Grain Use as Alcohol Fuels Feedstocks (Data Base), for the Department of Energy, November, 1978.

This study addresses the ethanol feedstock supply issue by looking at maximum feasible production of corn, wheat, and grain sorghum through the year 2000, and estimating the amounts of grains which would be available for ethanol production. The major finding of the report is that ethanol feedstock supplies through the year 2000 would be sufficient to replace two percent of gasoline consumption with ethanol. The major limitation of the analysis is

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that economic impacts on agricultural production of a large scale ethanol program are not considered.

5. Riddle, W.E., T.A. McClure and E.S. Lipinsky, "A Preliminary Report on Availability of Sugar Crops for Production of Alcohol Fuels to the Raw Material Availability and Economic Subcommittee of Alcohol Fuels Policy Review Group", Battelle Columbus Division, Columbus, Ohio. November, 1978.

The production of ethanol from sugarcane, sugarbeets, and sweet sorghum is investigated. Based on estimates of the availability of sugar crops, the report indicates that 111 million gallons of ethanol could be produced in 1980 and 9.4 billion gallons in 2000. Sweet sorghum represents the greatest potential among sugar crops. The major limitation of this study is that market forces are not seriously considered. Costs of ethanol production from beet and cane sugar will be substantially higher than for other feedstocks.

Other studies dealing with grains and sugar crops include:

6. Development planning and Research Associates Inc., Executive Summary of Gasohol Economic Feasibility Study, (Final report), prepared for the Energy Research and Development Center, University of Nebraska, Lincoln, Nebraska, July, 1978.

7. W. E. Riddle, T.A. McClure, and E.S. Lipinsky, Batelle Columbus Laboratories. Availability of Sugar Crops for Production of Alcohol Fuels (Final Data Base) to the Raw Material Availability and Economics Subcommittee of the Alcohol Fuels Policy Review Group, November, 1978.

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8. W. Park, G. Price, D. Salo, Biomass - Based Alcohol Fuels. The Near-Term Potential for Use with Gasoline. Mitre Technical Report, MTR-7866, Metrek Division of the Mitre Corporation, McLean, Virginia. July, 1978.

9. Victor Yang, Sergio C. Trindade. Centro de Tecndogria Promon - CTP Rio de Janeiro, Brazil, Brazilian Gasohol Program.

10. Gavett, Earle E., Gasohol from Grain--The Economic Issues, ESCS No. 11, USDA, January, 1978.

11. Richard A. Nathan, Fuels from Sugar Crops Systems Study for Sugarcane, Sweet Sorghum, and Sugar Beets, prepared for Department of Energy, 1978.

12. U.S. Department of Energy, Fuels from Biomass Program, Program Summary, January, 1978.

13. Milton L. David, Gasohol Economic Feasibility Study, Final Report, prepared for Energy Research and Development Center, University of Nebraska, Lincoln, July, 1978.

14. Lipinsky, E.S. McClure, T.A. Otis, V.L.: Scantland, D.A.; Sheppard W.J., Systems Study of Fuels from Sugarcane, Sweet Sorghum, Sugar Beets, and Corn, Volume IV, Corn Agriculture Task 77, Final Report, March 31, 77; 211p. Price Code A10/MF401. CGW-7405-ENG-92.

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B. Agricultural Residues and Animal Wastes

1. SRI, Availability and Cost of Agricultural and Municipal Residues for Use as Alcohol Fuels Feedstock (Draft), prepared for the Department of Energy, Washington, D. C. November, 1978.

This report represents study of the availability and costs of agricultural residues for use as alcohol feedstock. The major finding of this report is that the most abundant agricultural residues are seasonal and used for their nutrient properties by the agricultural sector. Collection and handling problems, as well as the long range impacts of removal from the soil are potential constraints whose magnitudes are not yet quantifiable. Costs of ethanol from residues (e.g. corn stover or wheat straw) are calculated at $1.10 and $1.90 per gallon. Small capacity projects using cheese whey, for example, may be able to produce ethanol at similar prices.

2. SRI International, Preliminary Economic Evaluation of a process for the Production of Fuel Grade Ethanol by Enzymatic Hydrolysis of an Agricultural Waste, Menlo Park, California, November, 1978.

This study concerns the preliminary economic feasibility of a process for converting agricultural waste (wheat straw) to fuel grade ethanol through enzymatic hydrolysis. The base case design is for a 25 million gal./yr. plant for 95 vol. percent ethanol from wheat straw. Estimates of process operating costs and required selling prices were based on typical industrial conditions.

3. Orkis, Benjamin J., et. al., Preliminary Environmental Assessment of Energy Conversion Processes for Agricultural and Forest Product Residues, Volume 1, Stanford Research Institute, Menlo Park, California, March, 1978.

A preliminary assessment was made of the environmental impacts of several types of conversion processes for producing energy or fuels from agricultural

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and forestry residues. Residues included animal manure, and forestry and field residues, including sugar cane. Special attention was given to pesticide and herbicide residues in conversion processes.

Other studies dealing with energy production from agricultural residues and animal wastes include:

4. Alich, J.A., et. al., Evaluation of the Use of Agricultural Residues as an Energy Feedstock: A Ten-Site Survey, Volume I, Summary and General Information, Stanford Linear Accelerator Center, for the Department of of Energy, July, 1977.

5. West Virginia Univ. Morgantown, Dept. of Chemical Eng., Technical, and Economic Assessment of Methods for Direct Conversion of Agricultural Residue to Usable Energy, prepared for ERDA, Washington, D.C. October 20, 78.

6. J. T. Pfeffer, Biological Conversion of Biomass to Methane, quarterly progress report prepared for ERDA, Division of Solar Energy, Washington, D.C. April, 1977.

7. Ashare E.: Wentworth, R.L., Wise, D.L., Fuel Gas Production from Animal Waste. Report of Quarterly Review Meeting, Palo Alto, California. December 13-14, 1976. Dynatech Report No. 1573. February, 1977.

8. Wane, Silvia A., Fuels and Energy Production by Bioconversion of Waste Materials - State-of-Art, August, 1976. Contract grant EPA-68-03-0295.

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C. Wood and Forestry Residues

The Mitre Corporation has conducted several studies on the feasibility of wood and wood residues as a fuel source. The results of these studies indicate that there is some potential for presently underutilized standing forests. Silvicultural biomass farms represent substantial long term potential, but would be constrained by biomass productivity and land availability. Because of the lack of prior experience with biomass tree farms, the economics involved are not well defined. It is estimated that 7 to 17 million dry tons of wood and bark residues go unused annually. Because of transportation costs, the potential for utilization of wood residues will generally be site specific.

Studies analyzing wood and wood residues as a feedstock or direct source of energy include:

1. D. Salo and e. al., Near-Term Potential of Wood as a Fuel, Metrek Division of the Mitre Corporation, McLean, Virginia, July, 1978.

2. The Mitre Corporation, Metrek Division, Potential Availability of Wood as a fuel/feedstock for the next 25 years, McLean, Virginia, November, 1978.

3. D. J. Salo and et. al., (Mitre Corporation), Silvicultural Biomass Farms, Volume III, Land Suitability and Availability, Report No. MTR-7347 (vol. 3) for DOE, Division of Solar Energy, May 1977.

4. R.E. Inman, Silvicultural Biomass Farms, Volume I (summary), Metrek Division of the Mitre Corporation, McLean, Va., May, 1977.

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PRODUCTION OF FUEL--GRADE ETHANOL FROM GRAIN

I. Introduction

Recent international events and their repercussions in the domestic fuel markets have increased interest in the utilization of agricultural commodities and wastes for production of fuel-grade ethanol. It has been demonstrated that a 90 percent gasoline/10 percent ethanol blend ("gasohol") can be burned in conventional automobiles without engine modification and, apparently, without significant performance degradation or engine deterioration. Since transportation accounts for over half of total domestic petroleum consumption, a successful alcohol fuels industry ostensibly offers the potential for substantially reducing U.S. crude oil imports. Table 1 shows the gross crude oil imports displaced by various levels of a domestic gasohol program.1/

Table 1

Gasohol as % of Total Gasoline Consumption	Crude Oil Savings (Mil. BBL/Yr.)	Crude Oil Savings Daily as % of Average Daily Imports
100%	238	8.2%
90	214	7.5
80	190	6.6
70	167	5.8
60	143	5.0
50	119	4.2
40	95	3.3
30	71	2.5
20	48	1.7
10	24	.8
5	12	.4

Source: Based on import data for Jan.-July 1978 published in Monthly Energy Review, U.S. Department of Energy. Total gasoline consumed is assumed to be 100 billion gallons annually to simplify calculations throughout this paper. Actual gasoline consumption in 1978 was approximately 110 billion gallons.

1/ Throughout this paper, "gasohol program level" refers to the ratio of gasohol to total domestic automobile fuel consumption (gasoline base stock only) expressed as a percentage. Thus, a 10 percent gasohol program level refers to a program in which 1 percent of total automobile fuel consumption would consist of ethanol, assuming a 90 percent gasoline/10 percent ethanol blend.

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Net crude oil savings would be substantially smaller (and perhaps negative) at all program levels, depending upon the priority fuel use constraints built into a gasohol program, since it takes considerable petroleum to produce agricultural products, convert them to ethanol, and distribute the ethanol to consumers.

The U.S. Department of Agriculture has taken a positive stance on the production of alcohol fuels from agricultural materials. Secretary Bob Bergland testified on July 26, 1978, before the Senate Committee on Agriculture, Nutrition and Forestry:

> "We in USDA are optimistic that production and residues from U.S. land can contribute [substantial amounts] of renewable energy, if the fuels from biomass program is managed effectively. However, we recognize that the economic feasibility and the energy efficiency of converting some agricultural and forestry products nto fuels or petrochemica substitutes are questionab e at the present time and are dependent upon site specific factors. Furthermore, we are not confident that we know exactly what practices will result in the largest payoffs in developing a fuels from biomass industry over the next few years."

Accordingly, the Secretary emphasized the importance for the time being of research, development, and demonstration programs in the biomass energy area to resolve uncertainties and focus policy in directions consistent with the broader objectives of national agricultural policy.

USDA has programmed approximately $3.9 million of Fiscal Year 1980 funds for the development of alternative feedstocks and conversion technologies for alcohol fuels production. An additional $2 million is programmed for development and design work on small-scale, on-farm energy generation, including distillation of fuel alcohol. The Department of Agriculture has made tentative commitments of $42.7 mi ion of oan guarantees authorized by Section 1420 of the 1977 Food and Agriculture Act for four pilot projects to convert agricultural and forestry commodities into fuels and industrial hydrocarbons. These projects will encourage the commercialization of new technologies and feedstocks which can improve the economic viability and energy efficiency of ethanol derived from agricultural materials. For instance, one of these projects is designed to produce ethanol from the cellulosic materials of sugar cane using a new conversion technology. Another of the pilot projects would demonstrate the large-scale use of sweet sorghum as a feedstock for ethanol production.

Department of Agriculture activities on alcohol fuels to this point have emphasized residues as feedstocks for fuel production, rather than food and feed commodities (e.g., grain) per se. The residue-as-feedstock

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approach aims not only at reducing the cost and increasing the energy efficiency of fuel alcohol production; it also reduces the necessity for a direct trade-off between the use of basic agricultural commodities for human food (or animal feed), on the one hand, or for vehicular fuel, on the other.

Perhaps the crucial policy question currently posed by the gasohol issue is whether (and under what conditions) it would constitute good public policy to provide incentives toward a large-scale grain-to-alcohol program, rather than to forego any such commitment for the time being and continue the development and demonstration work to produce liquid fuels from cellulosic (residue) materials, shale oil, coal, or other alternative sources.

If a large-scale grain alcohol program were pursued at this time, the initial action decisions must involve the construction of additional fuel alcohol distilleries, not the production of grain feedstocks. Table 2 shows currently available distillation capacity.

Table 2

Estimated U.S. Ethanol Capacity, 1978

Use	Synthetic	Fermentation (Million Annual Gallons)	Total
Industrial	210	50	260
Beverage	---	98	98
Total Production	210	148	358
Idle Capacity	119	41	183
Available for Fuels	---	23	23
Total Capacity	329	212	541

Source: Summarized by Arthur D. Little, Inc., based on U.S. Treasury Department and U.S. Department of Energy data.

The synthetic ethanol capacity indicated in the table relies upon petrochemical feedstocks that are too expensive to permit their use to produce ethanol for gasohol except on a "distress" basis. The "idle capacity" figure under fermentation represents the capacity of old obsolete distilleries for the most part, considered unlikely to return to production without substantial overhaul, or distilleries unable to produce fuel-grade (anhydrous) ethanol with present facilities. Thus, the available capacity suitable for producing fuel-grade ethanol is estimated at 23 million gallons, and indications are that most of this capacity has been drawn into

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production in recent months under the inducement of Federal and State tax incentives. Since even a 5 percent national gasohol program would require 500 million gallons of fuel-grade ethanol, and since approximately 2 years is required for plant construction, decisions on plant construction clearly must precede decisions on actual production of crops to provide feedstock for any sizable gasohol program.

It is crucial, however, that policy decisions on the construction of distilleries take into consideration all impacts, including agricultural impacts, of an alcohol fuels policy, because the construction of plants would tend to lock the Nation into the allocation of grain feedstock approximating total plant capacity. In that respect, whereas a substantial body of analysis has addressed many of the technical and economic issues involved with a gasohol program, nowhere is there a current interpretation of the situation which focuses upon crucial factors from the perspective of national food and agricultural policy.

This paper focuses upon some key issues of an alcohol fuels policy, with particular emphasis upon the relationship with the farm sector and food and agricultural policy. Table 3 depicts some of the agricultural implications of specified gasohol program options.

Two premises of table 3 should be made explicit: (1) that fuel ethanol programs of .5, 1.0, 1.5, and 2.0 billion gallons of annual ethanol production from grain include the full range of options that warrants serious consideration in terms of a current policy commitment; and (2) that such a range of alcohol fuel options should focus upon corn as the dominant feedstock. The basis for the first premise is developed subsequently in this paper. Regarding the second premise, corn is the agricultural commodity which is potentially available in sufficient supply to accommodate these optional program levels, can be readily converted to ethanol using existing fermentation technology, and (with the credit for byproduct distillers' dried grain) equals or exceeds other potentially available agricultural commodities in terms of economic feasibility for fuel ethanol production.

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Table 3

AGRICULTURAL IMPLICATIONS OF GASOHOL PROGRAM OPTIONS

	GASOHOL PROGRAM LEVELS			
	5 Billion Gallons	10 Billion Gallons	15 Billion Gallons	20 Billion Gallons
Ethanol Required (Billion Gallons)	.5	1.0	1.5	2.0
Corn Feedstock Required (Million Bushels)1/.....	190	380	570	760
Feedstock Requirement as % of Current Corn Reserve Stock Objective (666 Million Bushels)2/	28%	57%	86%	114%
Feedstock Requirement as % of Current CCC Feedgrain Inventory (5 April 1979)	142%	284%	426%	564%
Corn Acreage Required (Million Acres)3/	1.9	3.8	5.7	7.6
DDG Production (Million Tons)4/	1.6	3.2	4.8	6.4
DDG Production as % of 1976 Domestic Consumption of DDG	428%	856%	1,283%	1,711%
DDG Production as % of 1976 Production of High-Protein Feed Supplement	6.6%	13.2%	19.8%	26.4%

1/ Assumes 2.6 gallons of ethanol per bushel of corn.

2/ The current Corn Reserve Stock Objective is actually a range: 629-703 million bushels. The mid-point is used for convenience of calculation.

3/ Assumes 16.8 pounds of distillers dried grain per bushel.

4/ Assumes corn yield of 100 bushels per acre.

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In addition, two basic assumptions underlie the analysis in this paper: (1) that the overriding objective of a U.S. alcohol fuels industry would be the energy-efficient production of priority liquid fuel to replace foreign sources, and therefore that any Government incentives for a fuel alcohol program should be structured to assure consistency with that goal; and (2) that national food and feed requirements (for domestic and export use) must not become a residual claimant upon the Nation's agricultural production system, and therefore that any Government supported, large-scale grain alcohol program should not subordinate food and feed requirements to the production of fuel from agricultural sources.

Subsequent sections of this study examine the following questions:

- What are the overall economic implications of gasohol policy options, particularly with respect to agricultural variables?
- What are the implications of various gasohol policy options for the farm sector and for national food and agricultural policy?
- How must a grain alcohol program be designed to assure a significant net contribution to priority fuel supplies?
- What policy conclusions appear to be sensible?

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II. The Economics of Gasohol

This section examines the economics of alcohol fuels made from grain, with particular emphasis upon agricultural feedstock and by-product variables.

Specifically, the section discusses:

- prospects for entry into the ethanol industry by fuel ethanol producers;
- a base case assessment of the current economics of fuel ethanol;
- the question of whether ethanol is a premium gasoline additive; and
- a dynamic assessment of the economics of ethanol with variance in corn and distillers dried grain prices.

Structure of the Ethanol Industry

Structurally, the grain ethanol industry is highly competitive. In particular, new entry is unrestricted, except by competition with gasoline, and easy compared with most other industries that manufacture products from primary raw materials:

- The essential technology is simple, well-established and freely available to anyone with sufficient capital to build a plant.
- Economies of scale exist but are not sufficient to bar entry at relatively modest capital cost by industrial standards ($35 to $40 million).
- Labor requirements are modest and involve no skills that are in particularly tight supply.
- Essential raw materials (corn) are available in highly elastic supply at current market prices.
- Markets for the principal product are well-defined and can be penetrated at several levels in the distribution chain.

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- Consumers are well aware of the principal product and acceptance is high provided the price is perceived as competitive with alternatives.

- Markets for the major byproduct are also well defined and unrestricted.

- Prices are constrained by the availability of an alternative: straight gasoline.

Entry has not taken place so far on a significant scale primarily because the principal product, ethanol, could not be sold profitably in the gasoline market at prices competitive with those of gasoline.

There is, however, considerable gasohol being marketed at the present time, especially in Iowa and one or two other corn belt States. All of this fuel is being blended at the distributor or retailer level and utilizes ethanol produced by distil eries constructed initially to serve other end-use markets. Existing plants with excess capacity were given a powerful economic ncentive to penetrate the gasoline market by passage of the 1978 National Energy Act, which contained a provision exempting gasohol from the 4 cents per gallon Federal Gasoline Tax. For a 90 percent gasoline/10 percent ethanol blend, this exemption is equivalent to a 40 cents per gallon subsidy on the ethanol.

As noted in the preceding section of this paper, the incentive provided by this Federal tax waiver, and State tax waivers, has drawn virtually all readily-available idle plant capacity into the production of fuel alcohol. However, the tax waivers do not appear to have encouraged the entry of significant new distillery capacity as yet.

Base Case Estimate of the Cost of Producing Ethanol from Corn

For every study that has been published on the gasohol issue, there is a different estimate of how much it costs to produce ethanol from corn. This s nevitab e since costs are influenced to some degree by local circumstances specific project peculiarities, etc., and are in any case a "moving target" because of nflation. At the present time, however, there appears to be agreement within 10 cents or so per gallon so that any of several recent estimates developed by competent analysts can be used without danger of unduly prejudicing the analysis. The estimate used here was developed largely, though not entirely, by DPRA, Inc., a Kansas consulting firm, for the so-called Exon Report. This estimate is summarized in Table 4.

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Table 4

Analysis of the Subsidy Requirements for a 40 Million Gallon Per Year Distillery

Feedstock costs ($2.50/Bu. corn)		$ .96
Direct costs (fuel, labor, etc.)		.24
Indirect costs (administrative, marketing, plant overhead)		.09
Capital recovery		.32
	TOTAL	$1.61
Less octane credit		-.15
		$1.46
Less DDG credit ($110/ton)1/		-.36
		$1.10
Less refinery gate price of non-lead gasoline		-.53
		$ .57
Less Federal Gasoline Tax exclusion		-.40
ESTIMATED ADDITIONAL SUBSIDY REQUIREMENT PER GALLON OF ETHANOL		$ .17

1/Assumes 6.5 pounds of DDG produced per gallon of ethanol.

Note that Table 4 is developed for a 40 million gallon per year plant. Both smaller and larger plants are feasible. DPRA estimates that the capital cost for a 40 MGY plant using corn would amount to about $1.29 per gallon of annual capacity. This is in close agreement with estimates provided more recently by Midwest Solvents, Inc., to a research group at the University of Minnesota. Costs decline somewhat as plant size grows because of economies of scale, considering only capital charges and conversion costs. Assembly costs on feedstocks and delivery costs of product ethanol may rise for significantly larger distillery capacity, however, and these factors may act as a constraint on the size of new plants penetrating the gasohol market. Representative capital costs for other sizes of plant are presented in Table 5. These are slightly higher per unit of annual capacity than are reported in the DPRA report.

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Table 5

Capital Costs for Ethanol Plants of Various Sizes

Plant Capacity (Million Gal. Ethanol/Yr.)	Corn Feedstock Required (Million Bu./Yr.)1/	Total Investment Cost (Million 1978 $)	Investment Cost Per Gallon Capacity
4.2	1.6	$11.4	$2.72
8.4	3.2	17.8	2.11
12.6	4.9	23.1	1.83
16.8	6.5	27.6	1.64
21.1	8.1	32.2	1.53
25.3	9.7	36.2	1.43
29.5	11.3	40.0	1.36
33.7	13.0	43.6	1.29

Source: Economics of Gasohol (St. Paul: Unversity of Minnesota, Dec. 1978, p. 33). Data provided by Midwest Solvents, Inc., were in 1976 dollars. These have been converted to 1978 dollars by means of the GNP deflator for Gross Private Domestic Investment, Structures and Producers Durable Goods. The figures are rounded.

1/ Assumes an ethanol yield of 2.6 gallons per bushel of corn.

The cost estimates summarized in Table 5 assume that corn feedstock is available at a delivered price of $2.50 per bushel. Direct and indirect costs are based on standard engineering estimation procedures and are comparable with the estimates developed in other studies. The capital recovery estimate assumes a 10 percent interest rate, 15 percent after tax return on equity, and 70 percent leveraging. Higher leveraging results in a somewhat lower capital recovery estimate: for example, with 90 percent leveraging, DPRA estimates that conversion costs would be about 5 cents to 7 cents per gallon lower, assuming interest rates remain the same. It is unlikely, however, that a private firm could negotiate 90 percent leveraging in the absence of some form of Government loan guarantee.

The DPRA study did not attempt to estimate the impact of gasohol on mileage or the value of ethanol over and above straight gasoline as an octane enhancer. One would expect gasohol to yield fewer miles-per-gallon (MPG) of fuel in automotive service than does ordinary straight gasoline because ethanol contains less energy than the gasoline it replaces in gasohol. An early road test designed for the State of Nebraska by Professor W.A. Scheller seemed to indicate, however, that gasohol yields

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somewhat better gas mileage than gasoline alone. This study has been widely referenced in the gasohol literature and is the principal support for the judgment that gasohol improves mileage. It appears, however, that this study was flawed from the experimental design point of view and its results are no longer considered to be reliable. Among other things, the test vehicles used in the study were not standardized, nor were driving patterns etc. Furthermore, there is evidence that one or two of the gasoline pumps used to d spense the gasohol for the study vehicles were inaccurately calibrated and delivered more gasohol than was recorded.

Other small-scale tests have been run that indicate different results. For example, there s an ongoing study at the Unversity of North Dakota the preliminary results of which indicate that gasohol decreases MPG by about 3 percent in both winter and summer service. Simi ar results have been reported by various oil companies and automobile manufacturing firms that have experimented with gasohol. All of these studies, however, have their limitations. In short, there is no analysis as yet that would permit a conclusive statement on the issue of mileage impacts.

About the best that can be concluded at the present time, based on the information at hand is that the range of possible impact on mileage is relatively narrow: probably plus or minus 3 percent. For purposes of th s report, therefore, it will be assumed that gasohol does not differ significantly from straight gasoline in respect to mileage. While probably incorrect, this assumption seems more likely to bias the overall analysis in favor of gasohol than against it.

The issue of octane enhancement also has an important bearing on the economics of gasohol. A recent synthesis of research results on octane enhancement was executed by the Arthur D. Little, Inc., consulting firm. Although the results of this analysis have not yet been published by its sponsor, the main conclusions were made available and have been relied on heavily in the discussion to follow. These conclusions were corroborated by two other prominent consulting firms prior to their adoption for present purposes.

Analysis of the octane issue is complicated by the fact that the amount of octane enhancement derived from adding ethanol to straight gasoline depends on the octane value of the base gasoline. Moreover, differences in the composition of the base gasoline also appear to have significant imp cations for the enhancement to be derived from using ethanol as an add tive These facts have led EPA technicians to the conclusion that gasohol blending is likely to become a refinery function. This conclusion is reinforced by the fact that refineries are in the best position to adjust base stocks so as to achieve target Vapor Pressure Index (VPI) objectives notwithstanding the fact that ethanol has a higher vapor pressure than does straight gasoline.

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Aside from the chemical composition of the base gasoline, the octane enhancement from ethanol is more significant when the ethanol is added to octane base stocks than it is when added to high octane stocks. Since the base stock octane level varies considerably around the country, this means that the octane enhancement value of ethanol would also vary depending on regional circumstances.

The ADL conclusion is that a 10-percent addition of ethanol to regular unleaded gasoline will increase octane by one to two numbers (R + M/2). This compares with Professor Scheller's estimate of three numbers. For present purposes, therefore, it will be assumed that the 90 percent gasoline/10 percent ethanol blend yields a 1.5 octane number increase.

Given a 1.5 octane number improvement, the question of what ethanol is worth as an octane enhancer then becomes one of what the public is willing to pay for the enhancement achieved. From the refinery's point of view, the value of ethanol in this context depends on how much it would cost to attain the same octane enhancement us ng crude oil distillates. In the long-run t s unl kely that consumers will be willing to pay much more than the appropriate octane enhancement value of ethanol to the refinery. This is estimated at the present time at about 1 cent per octane number Thus, a 90 percent gasoline/10 percent ethano blend would be expected to command a 1-2 cent per gallon price d fferential over non- eaded gasol ne depend ng on where one comes out on the issue of how much ethanol actually enhances the octane of a given gasoline. This is equivalent to a value of 10 cents to 20 cents per gallon of ethanol.

For present purposes, therefore, it will be assumed that the value of ethanol as an octane enhancer is approximately 15 cents per gallon over the price of non-leaded gasoline. This figure is used for the base case cost estimates, in Table 4.

The 36 cents per gallon byproduct credit for Distillers' Dried Grains (DDG) is based on recent delivered DDG prices in the Chicago/Minneapolis market. Prices are somewhat higher in the northeastern United States, where feedlot operators must pay more for other feedstuffs. Note, however, that comparatively little DDG (less than 425,000 tons annually) is currently sold in the U.S.

The refinery gate price for unleaded gasoline presented in Table 4 represents the USDA Office of Energy's best estimate of the current tank wagon price. This price estimate is probably favorable to ethanol, in the sense that it is substantially above the current marginal refinery cost of producing gasoline from crude oil feedstocks Note, also, that the data presented here do not contain an estimate of the added cost of transporting and storing gasohol relative to gasoline. TRW, Inc., in a research report funded by the Department of Energy, has estimated this cost increment at about 3 cents per gallon.

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On the basis of the above assumptions, Table 4 yields a base case subsidy requirement of about 17 cents per gallon of ethanol over and above the current 40 cents per gallon subsidy represented by the Federal Gasoline Tax exemption. Table 6 presents estimates of the total subsidy costs of various levels of national gasohol programs, derived from the base case.

Table 6

Base Case Annual Subsidy Requirements at Different Program Levels

Gasohol Program Level (% of 100 Bil. Gal.)	Billion Gallons Ethanol	Subsidy Requirement		
		Federal Gas Tax	Other	Total
		(Billions)		
100%	10	$4.0	$1.7	$5.7
90	9	3.6	1.5	5.1
80	8	3.2	1.4	4.6
70	7	2.8	1.2	4.0
60	6	2.4	1.0	3.4
50	5	2.0	.85	2.9
40	4	1.6	.68	2.3
30	3	1.2	.51	1.7
20	2	.8	.34	1.1
10	1	.4	.17	.57
5	.5	.2	.09	.29

Sensitivity of Ethanol Production Costs to Variations in Price of Agricultural Feedstocks and Byproducts

Corn Feedstock Price Variance

Figure A on page14 illustrates a sobering fact about corn as an industrial raw material.

Since the corn feedstock price comprises the primary cost of producing ethanol (see Table 4), fluctuations in corn prices cause wide variations in the cost of ethanol per gallon. As indicated by Table 7, which reflects the recalculation of base case (Table 4) production costs for various corn prices, a 10 cents per bushel increase in the price of corn increases ethanol feedstock costs by about 3.8 cents per gallon.

The impact of volatile corn prices on ethanol production costs is illustrated by the situation during 1972-1974. Between 1973 and 1974, the U.S. corn crop declined by nearly 1 billion bushels, notwithstanding a 5.3 percent increase in the total acreage planted to corn. In 1973,

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Figure A

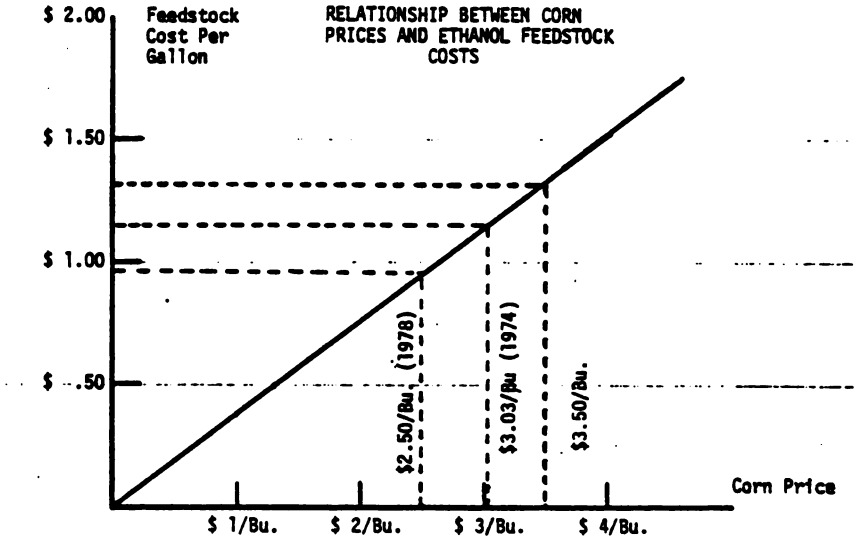

Table 7

Effect of Various Corn Prices on the Estimated Subsidy Required to Cover Full Ethanol Production Costs

Price of Corn Per Bu.	Feedstock Cost Per Gallon	Total Ethanol Costs, Incl. Capital Rec.	Credits for DDG, Octane and Fed. Tax Exclusion	Estimated Net Subsidy Requirement
		(Per Gallon)		(Per Gallon)
$1.00	$ .38	$1.03	$.91	-41.0¢
1.50	.58	1.22	.91	-22.0¢
2.00	.77	1.41	.91	- 3.0¢
2.50	.96	1.60	.91	16.0¢
3.00	1.16	1.79	.91	35.0¢
3.50	1.35	1.98	.91	54.0¢

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corn production remained almost static despite an 8 percent increase in acreage harvested. Heavy export demand in 1972 as well as in 1973-74, combined with the production shortfall in 1974 and the stationary output in 1973, resulted in the fall of corn stocks from 1,127 million bushels in 1971 to only 361 million at the end of September in 1974--or to slightly over 1 month's domestic requirements for livestock and the domestic food system. Under these circumstances, corn prices rose sharply:

1971-72	+ 49¢/bu.	+ 45.4%
1972-73	+ 98¢/bu.	+ 62.4%
1973-74	+ 47¢/bu.	+18.4%

Thus, a hypothetical fuel-grade ethanol producer already in production at the beginning of 1971 would have watched his feedstock costs escalate by fully 74.6 cents per gallon by the end of 1974.

It is true, of course, that the hypothetical ethanol producer could have protected himself to some extent from the risk of fluctuating corn prices by long-term contracting and by hedging operations in the commodity exchanges. These are, however, essentially cushioning devices They would not have shielded him entirely from a sharp increase in his feedstock costs. They would have been of no help at all to new producers attempting to enter the industry during that period.

The point is that natural fluctuations in corn production levels can prove devastating to the cost and availability of ethanol feedstocks for any significant-scale gasohol program, unless large reserves of corn are maintained as a regular policy. Between 1963 and 1977, there were significant shortfalls in the level of corn production during 5 crop years, with an average decline in production on those five occasions, compared to the previous year, of 506 million bushels--the equivalent of the feedstock requirements of a 13 percent nationa gasohol program. It would appear that any significant gasohol program would have to be inked with the maintenance of a gra n reserve isolated from the market until corn availability and price fluctuations made release from the reserve desirable in order to stabilize the market and keep the ethanol distilleries in production. The alternatives are extremely unattractive:

- Diversion of available corn supplies from the livestock and food system during periods of shortage via sharp price increases or artificial incentives of some kind.
- Curtailment of corn exports (currently running in excess of 1.5 billion bushels per year).
- Curtailment of ethanol production.

The first option above could impact severely on the supply and price of meat to consumers. The second option would drastically disrupt markets,

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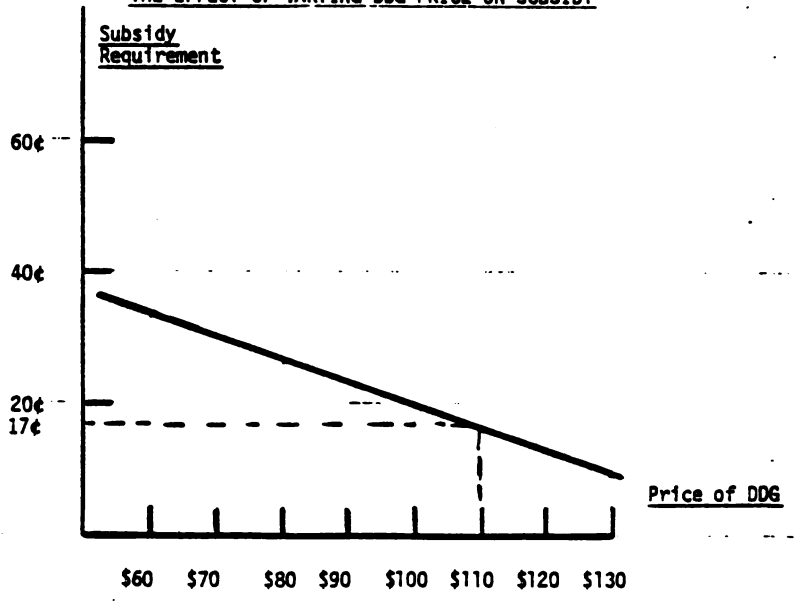
both domestic and international. The third option would impact on the availability of automobile fuel at the consumer level with severity proportional to the size of the national gasohol program. It should be remembered in this context that domestic petroleum refining capacity would, over time, adjust to the programmed substitution of ethanol for straight gasoline, with the result that it would be difficult in the short-run to increase gasoline production sufficiently to offset reductions in ethanol output. This would mean gasoline shortages again coupled with pressure on retail gasoline prices. Politically, therefore, it would be very difficult to resist pressures for cutting exports as a means of balancing the domestic corn account and keeping the distilleries in production.

Distillers' Grain Price Variance

The base case cost table (Table 4) also indicated that the economics of ethanol from corn depend heavily on the market ability and price of distillers' dried grain (DDG), the principal by-product of corn distillation. The production of each gallon of ethanol results in the production of about 6.5 pounds of DDG. The 17 cents per gallon additional subsidy requirement in the base case reflected DDG at $110 per ton. The following chart illustrates the degree that the subsidy varies from 17 cents, given various DDG price levels.

THE EFFECT OF VARYING DDG PRICE ON SUBSIDY



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The average composition of DDG compared with corn and soybean meal is the following:

Feeding Values for Corn, DDG and Soybean Meal

	Corn	DDG	Soybean Meal
Dry Matter (%)	88.0	93.8	89.6
Crude Protein (%)	8.9	27.0	44.0
Crude Fat (%)	3.5	9.0	0.5
Crude Fibre (%)	2.9	13.0	7.0
Ruminant digestible Protein (%)	5.8	19.3	37.5

Source: Feedstuffs, Vol. 47, No. 38, Sept. 19, 1975, pp. 33-38.

Compared with soybean meal, currently by far the most important high-protein animal feed supplement, DDG has about half the ruminant digestable protein and twice the crude fibre content. In recent years, as might be expected, the ratio of the market prices of DDG and soybean meal has tended to equal the ratio of their ruminant digestable protein contents. Not much significance can be placed on DDG price information, however since current total domestic production does not exceed 425,000 tons per year, most of which is marketed in close proximity to the distilleries from which it originates.

The high fibre content of DDG limits its acceptability for the poultry and swine markets, which between them account for over half of total domestic high-protein feed supplement consumption. The fibre fills poultry stomachs and the birds stop eating before their nutritional and growth requirements have been satisfied. This cuts production. Swine are also unable to digest the fibre. Most DDG, therefore, goes into the dairy and beef finishing markets, where it competes with soybean mea and corn. Even in these markets, DDG is not a preferred feed because its relatively low protein content compared with soybean meal and its high fibre content slow down the process of weight gain in cattle. DDG also lacks certain vita amino acids, but these are easily added at modest cost. Trade sources ind cate that, relative to soybean meal use of DDG can slow the weight gain of feedlot animals by as much as 11 percent.

Not much is known at the present time about how much DDG could be absorbed by the ivestock sector and what the consequences would be for soybean and soybean meal production. Modest gasohol program levels, of course, would not ead to massive increases in the volume of DDG on the market and therefore would not induce significant competitive interaction between DDG and soybean meal Gasohol programs n excess of 10 percent, however, would result n increasing the supply of DDG on the market by a factor of ten or more. Depending on how rapidly this was attempted, the result could be a heavy downward pressure on the entire price structure of high-protein feed supplements.

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Table 8 indicates the tonnages of DDG associated with various levels of gasohol programming.

Table 8

DDG Production for Various Levels of Gasohol Programming

Gasohol as % of Total Gasoline Consumption (= 100 Bil. Gal.)	Distillers' Dried Grain Output	
	Millions of Tons	% 1977 Total Soybean Meal Consumption
100%	32.3	203
80	25.9	163
60	19.4	122
40	13.0	81
20	6.4	50
15	4.8	39
10	3.2	20
5	1.6	10

The USDA Office of Energy has canvassed the various academic and trade experts on the livestock feed industry to solicit opinions regarding the ability of the marketing system to absorb varying quantities of additional DDG production. The results of these inquiries are, of course, not conclusive, but the prevailing judgment seems to be that DDG production levels above 6 million tons per year could not be absorbed in the domestic economy any time soon without inducing some shift out of soybean meal and a decline in the price of DDG to a level just above the price of corn per ton. With corn at $2.50 per bushel, the DDG by-product credit assumed in the base case (Table 4) would decline from 36 cents per gallon of ethanol to 29 cents.

USDA has estimated the impact of various levels of DDG production on soybean and soybean meal output and prices. While these estimates are also severely constrained by the lack of significant past history with DDG, they indicate that the price impact on soybean meal starts to become significant (-13 percent) at the 20 percent level of national gasohol programming and that the soybean acreage impact becomes significant at the 20-30 percent level.

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An important caveat to the above discussion is the possibility that DDG export markets may develop in the future sufficiently to clear the market at high levels of ethanol production without substantial domestic price effects for the whole range of high-protein feeds. Should this occur, a large-scale gasohol program could be absorbed without the above consequences for the soybean sector and for DDG prices, provided DDG does not simply displace soybean meal in the export market. At the present time, however, DDG exports are small relative to soybean meal, and there is reason to retain skepticism as to the likelihood of their rapid growth. Available export data indicate that the foreign market for protein supplements is largely for poultry feeding. Furthermore, high-protein soybean meal is the commodity now actually sold in export markets, and it is questionable whether DDG is competitive in this market.

At least two summary comments emerge from this section:

- It does not appear that, given present technology, ethanol made from corn can compete successfully with straight gasoline without substantial public subsidies in some form. Crude oil prices will have to rise very significantly above present levels before this conclusion will require review.

- The economics of gasohol from grain are especially sensitive to unpredictable though highly likely fluctuations in the prices of several key variables, including grain feedstocks, distillers' dried grain, and straight gasoline.

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III. IMPLICATIONS OF ALCOHOL FUELS POLICY OPTIONS FOR AGRICULTURE

This section analyses the impacts of various alcohol fuels policy options on the farming sector and on national food and agricultural policy.

The following questions are addressed:

- Is sufficient land available to support specified options of alcohol fuel production?
- What is the relationship between the commodity reserve program and alcohol fuels policy options?
- Would it be feasible partially to substitute a gasohol program for agricultural price support and stabilization policies, and to shift Federal outlays from the agricultural policies to the subsidization of a gasohol program?
- What incidental relationships between a gasohol program and agricultural stabilization policies are significant?

A gasohol-from-grain initiative can require substantial acreage of cropland to produce the feedstock necessary for fermentation:

Ethanol (billions of gals)	Corn Acreage Required 1/ (mils.of acres)	% 1978 Corn Acreage Harvested
.5	1.9	2.7%
1.0	3.8	5.4%
2.0	7.6	10.8%
5.0	19.0	27.1%
10.0	38.0	54.3%

1/ Assumes corn yield of 100 bushels per acre, and 2.6 gallons of ethanol per bushel of corn.

An assessment of cropland utilization, farm productivity and future food requirements is fundamental to an understanding of the impact of gasohol policy options on agriculture. Table 9 summarizes farm productivity changes in U. S. agriculture over the last seven decades.

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Table 9

CHANGES IN FARM PRODUCTIVITY, 1910-1977

Period	%Productivity Change	
1910-14	2%	0%
1915-19	- 6%	
1920-24	- 4%	-8%
1925-29	2%	
1930-34	- 6%	
1935-39	4%	25%
1940-44	12%	
1945-49	4%	
1950-54	7%	34%
1955-59	12%	
1960-64	6%	
1965-69	3%	18%
1970-74	4%	
1975-77	3%	

Source: Changes in Farm Production and Efficiency, 1977 (Washington: U. S. Department of Agriculture, ESCS, 1978.)

Some factors underlying these productivity changes are:

- 1910-34: A period of extensive agriculture; new food supply needs were satisfied primarily by bringing new land into production rather than by increasing the productivity of existing land. Per capita acreage required to feed the American people remained relatively constant (See figure B, page 22).

- 1935-49: Era of technologically intensive agriculture is begun. Per capita acreage required to feed the American people declined by 8 percent. Chemicals (fertilizers and insecticides) usage tripled; mechanical power usage doubled. Land under irrigation doubled. Some significant crop hybrids (e.g., corn) appeared on the scene.

- 1950-64: Productivity growth was almost entirely intensive. Acreage required to feed the American people dropped by 37% per capita and permitted a 48% expansion in acres harvested for exports. Chemicals usage doubled; land under irrigation increased by 43%. Labor requirements declined by nearly a half. The full benefit of earlier hybrid crop introductions was realized.

- 1965-77: Farm performance began to reflect diminishing returns to intensive agriculture. Productivity rose by only 18 percent, although chemicals usage doubled again and mechanical power usage increased by 23 percent. Fresh water availability constraints slowed the move to irrigation. Farm acreage requirements per capita declined by only 4 percent.

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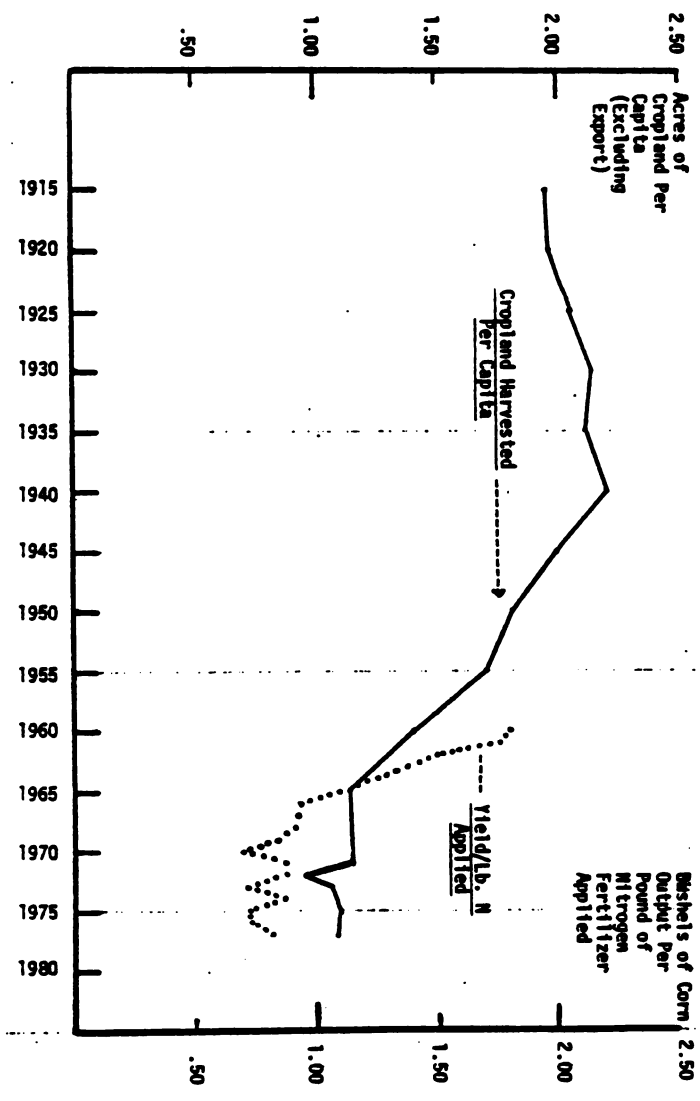
Figure 8

CROPLAND HARVESTED PER CAPITA 1915-77 AND CORN YIELDS PER POUND OF NITROGEN FERTILIZER APPLIED 1960-77



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The analysis indicates that, since the 1930s, U.S. agriculture has moved through a period of markedly rising productivity of land, due to the application of an interrelated package of capital and energy intensive technologies and inputs, followed by the recent period of slowed productivity as the intensive practices reached the stage of diminishing reutrns. 1/ Note, for example, the diminishing response of corn yields to nitrogen fertilizer applications during 1960-1977, and during the same period after over two decades of declining acreage requirements per capita. (Figure B).

Production resulting from the massive shift to capital and energy intensive agriculture that took place after 1935 generated increases in agriculture production that outdistanced (except during World War II and other emergency situations) the domestic and export market demand for U.S. farm produce. The result was chronic overproduction by U.S. agriculutre. The Federal policy response to chronic overproduction was long-term land retirement programs based upon contracts of up to 15 years duration to remove cropland from intensive cultivation, and the application of "permanent" soil conservation practices to that land. Under the Soil Bank Program initiated in 1956, the Cropland Adjustment Program of 1965, and related programs, an average of 21.4 million acres per year were removed from production during 1956-1967 under multi-year contracts, in addition to single-year acreage set-aside programs. 2/

Figure C (page 24) depicts the acreage removed from cultivation on a multi-year basis, and the one-year diverted acreage. As indicated, no multi-year diversion remains in effect, and during none of the 4 years 1974-1977 was there single-year diverted acreage. A total of 18.3 million acres was set aside on a one-year basis in 1978, and a roughly comparable level of one-year set aside is anticipated in 1979.

The data on cropland productivity and utilization trends indicate that the emerging situation in U.S. agriculture will be characterized by intermittant periods of relative scarcity and relative surplus of grain supplies, with movement between such periods of unpredictable duration and amplitude. Furthermore, the projection that global population will grow by 1.8 percent per year through the year 2,000, and that per capita consumption of meat protein will continue to grow on a worldwide basis, suggest a trend toward tighter food supplies relative to demand unless significant productivity breakthrough occurs.

What does this imply with regard to agricultural resource (particularly cropland) availability to support a grain alcohol fuels policy initiative? The prudent inference to be drawn is that, at most, commitment should be made to only a small increment of a national grain-based

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1/ It is especially significant to this overall analysis that fossil fuel energy inputs (petroleum fuel for heavy mechanical farm equipment, natural gas for nitrogen fertilizer and agricultural chemicals manufacture) underlie much of the increases in land productivity.

2/ Some acreage remained diverted under 5, 10, or 15 year contracts through 1977; the last new multi-year contract was consumated in 1967.

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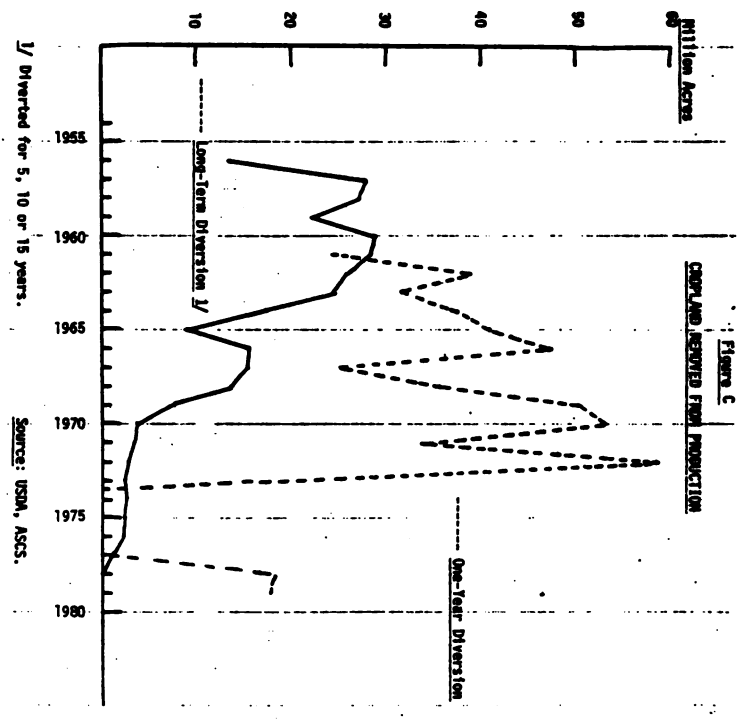

Figure C
CROPLAND DIVERTED FROM PRODUCTION

1/ Diverted for 5, 10 or 15 years.

Source: USDA, ASCS.

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ethanol program. In view of the uncertainty, such an incremental commitment would retain the options of foregoing further commitment, or of withdrawing completely, to minimize unrecoverable costs. In this regard, it is important to reiterate that, once the capital nvestment is made to plant and equipment for any level of gasohol program powerful forces will work toward assuring dependable grain feedstocks to operate those plants at near capacity. The Nation would thus tend to be locked into the allocation of grain for fuel production up to plant capacity once conversion plants are constructed and operational.

Substitutability of Gasohol Initiative and Present Agricultural Policies.

It has been suggested that the existing agricultural price support and stabilization programs might be at least partially replaceable by a gasohol program, and that Federal outlays associated with the former programs might be shifted to the latter. The apparent logic is that the agricultural and gasohol programs can serve the same function, and therefore are partially interchangab e For example, in 1978, Federal outlays for deficiency payments and one-year land diversion under the feed grain set-as de program (covering corn, grain sorghum and barley) were $228 million and 284 million respectively, or a total of $512 million. Since a gasohol program might have provided new market outlets for grain production from otherwise diverted acreage, such a program might substitute for the land set-aside program and become the recipient of the government incentive payments previously devoted to the set-aside program.

One element of agricultural stabilization policy that, apparently, no one has suggested can be replaced is the commodity reserve program. As described in the preceding section of this paper, volatile fluctuations n corn prices could destroy the viability of grain alcohol distilleries, since the per-gallon production cost of ethanol increases 3.8 cents for each 10 cents rise in corn prices. Therefore, the grain reserve would continue to be needed to narrow the range of fluctuations in grain prices for human food and animal feed purposes, as well as to ensure an adequate supply of feedstock for fuel alcohol distilleries.

Indeed, the 666 million bushel corn reserve stock objective would need to be increased to accomodate the additional fuel use dimension of the program. The volume of increase would depend upon the level of gasohol program, but in any case additional financial outlays for storage charges, storage facility construction, and other associated costs could be expected.

What about the substitutability of a gasohol initiative for land diversion programs? It might have been feasible to consider the substitution of grain alcohol production for the long-term land retirement program of the 1950s and 1960 s , the function of which was to offset a chronic overproduction tendency in U.S. agriculture. An alcohol fuels industry might

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then have provided market outlets for grain produced from the acreage removed from production under the long-term contracts. 3/

With respect to the present and emerging situation, it should be noted that during none of the 4 years 1974, 1975, 1976, and 1977 was there a single-year set-aside program in effect. Therefore, no Federal outlays were available for potential shift during any of those years. Further, the present price support and stabilization programs in agriculture are designed to supplement the reserve program in offsetting unpred ctable variations in supply relative to demand from year to year, not to compensate for chronic oversupply. 4/ As noted earlier, this seems the prudent projection for the emerging future situation, particularly since the vo at ity of farm production levels is increased by intensive agricultura practices. For example, heavy use of nitrogen fertilizer to increase corn yields has also increased the amplitude of fluctuations in corn yields due to weather variations, since positive yield response to nitrogen is dependent upon favorable weather conditions.

3/ Even there, the 15-20 years of chronic overproduct on associated with the rise of energy-intensive agriculture was perhaps of insufficient duration to warrant locking that acreage into fuel production and away from food and animal feed production. An alcohol distillery is generally amortized over a 30 year period, for example, and a shorter period of cost replacement would significantly increase the production cost of the ethanol.

4/ It has been suggested that a distinction might be drawn between the deficiency set aside payments made in 1978 to producers who participated in the set-aside program in order to guarantee a prescribed level of return on gra n actually produced, on the one hand, and the payments made to producers for additional voluntary acreage diversion, on the other. The suggestion is that the additional vo untary diversion payments could be replaced by incentives for gasohol, even if the deficiency payments could not. However, no voluntary diversion payments would have been required for feed grains in 1978 and 979, except that, in order to accommmodate other policy object ves, the spread between the nonrecourse loan rate and the guaranteed payment level was narrowed to a degree that rendered participation in the set-aside program insufficient to achieve the required level of acreage diversion. Therefore the voluntary diversion was added as a mid-year correction. The point is that no meaningful distinction can be drawn between the deficiency and voluntary diversion outlays; both are designed to serve one-year stabilization purposes rather than to offset chronic overproduction.

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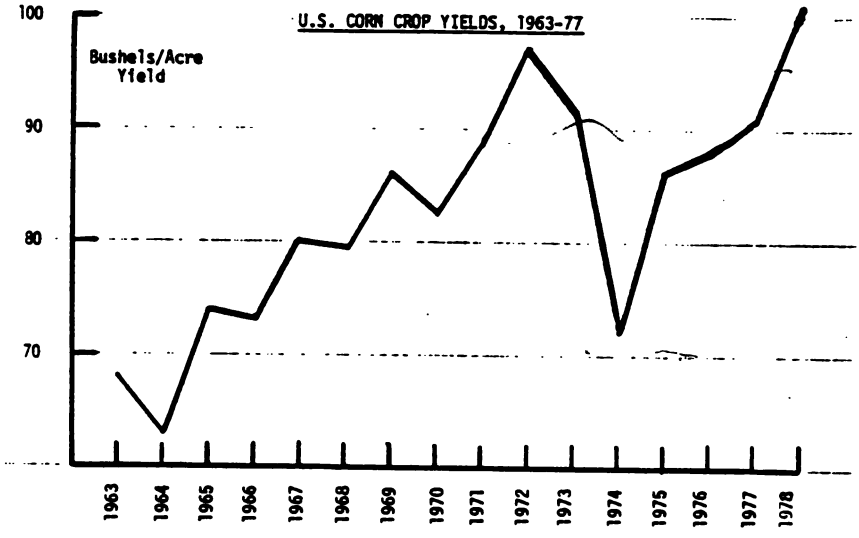
As Figure D depicts, corn yields per acre during the 1970 s varied between 71.9 in 1974 and 101.2 (estimated) in 1978, variation of -8.7 and +20.6 bushels per acre from the average (mean) of 80.6 bushels per acre.

Figure D



During the 1970s , an average of 65 million acres of corn land was harvested each year. Production varied from 1.2 billion bushels below average to 1.0 billion bushels above average. These variations, as related to the current corn stock reserve objective of 666 million bushels, are 180 percent below and 150 percent above the reserve objective. It is this extreme (an uncontrollable) variation from year to year. not chronic overproduction, to which present and emerging agricultural price support and stabilization programs are directed.

The conclusion, then, is that agricultural price support and stabilization policy serves different functions than an alcohol fuels program would serve, and therefore no substitution and shifting of Federal outlays is feasible. Indeed, a commitment to any increment of a national gasohol policy, however large or small, must assume that the

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U.S. agricultural production system will be able to reach supply-demand equilibrium at the higher level of production necessary to accommodate the gasohol initiative, on top of the inevitable weather-induced year-to-year fluctuations in production. Otherwise, the additional demand for gra n imposed by the gasohol initiative would threaten to result in chronic scarc ty of food supplies and, as a practical matter, would generate pressures for constraints on grain exports which would be counterproductive for the farm producer as well as other public interests.

Incidental Relationships between Gasohol and Agricultural Policies.

A though an alcohol fuels program could not substitute for agricultura stabi ization policies, the existence of grain alcohol disti eries cou d provide an additional outlet for disposition of surplus commodities which occur in excess of reserve target levels and effective market demand. For example, there is in Commodity Credit Corporation inventories as of April 5, 1979, 133.7 million bushels of feed grains (corn, grain sorghum, oats and barley) and 196,890 tons of raw sugar, which would be convertible into 378.7 million gallons of anhydrous alcohol. While it would not be sensible to construct alcohol distilleries to handle such surpluses because the amount of available surplus commodity (if any) is unpredictable except on a very short-term basis, the incidental impact on agricultural policy of having an alcohol fuels outlet for such surpluses might be beneficial. 5/

The existence of an alcohol fuels industry would also enable acreage diverted from the production of basic farm commodities (e.g., otton, wheat, corn gra n sorghum) under the one-year set aside to be devoted to the production of crops for fuel alcohol, as authorized by the Emergency Agricu tura Act of 1978. Again, this should be recognized as an ad hoc, incidental relationship that could occur between the set-aside program and an alcohol fuels industry. Because the amount of available set aside and (if any) is unpredictable except on a very short-term basis, it would not be practicable to construct a cohol distilleries with reliance for feedstocks upon production from set-aside acreage.

5/ Similarly, the incidental impact of having an alcohol fuels outlet for inferior grade grains and other commodities might be beneficial, although alcohol distilleries could not be built based upon such feedstocks of unreliable availability.

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The emergency Agricultural Act of 1978, apparently in order to enhance equity and practicality of administration, disallowed the use of set-aside acreage to grow any commodity for fuel usage if a set-aside program is currently in effect for that commod ty The statute thus in effect prohibited production of corn or grain sorghum for ethanol production on set-aside acreage in 1978 and 1979, since a feed grain set-aside program was effective during both years. Of course a decision could be made, for any upcoming crop year to forego or reduce otherwise requ red set-aside acreage to meet projected effective demand for grain generated by a cohol distilleries. Again, however, this presupposes the ex stence of an alcohol fuels industry in a year when set-aside acreage would be otherwise warranted, and affords no sensible basis for the construction of fuel alcohol distilleries.

In sum, an alcohol fuels industry and agricultural policies would be mutually supportive of one another only in various incidentally (or accidental) ways. These interrelationships could be expected to result in additional costs (for increased reserve stocks) as well as benefits (in the form of additional outlets for short-term commod ty surpluses), and the net cost/benefit impact would be difficult to determine. Because these related aspects are large y incidental, and their net impact in terms of costs and benefits is indeterminant, they cannot be prudently taken to justify or militate against, the encouragement of an alcohol fuels industry per se.

Several summary comments emerge from this section:

- Due to extreme uncertainty regarding cropland availability on a dependable basis for fuel alcohol production, any commitment to a gra n-based ethanol program should be restricted to a small ncrement of a national gasohol program, in order to retain the options of foregoing further compitment, or of withdrawing completely, to minimize unrecoverable costs.

- The use of corn as a feedstock for fuel ethanol production would require additional investment in storage facilities and inventories to ensure a dependable, continuous supply to distillers and to avoid the diversion of grain from food and feed needs.

- The agricultural price support and stabilization policy serves different functions than an alcohol fuels program would serve, and therefore no substitution and shifting of Federal outlays is sensible.

- Some significant incidental relationships between agricultural programs and an alcohol fuels program might be expected to develop (involving disposition of surplus grain stocks, planting on set-aside acreage for fuel production, etc.), but such incidental interactions cannot sensibly be taken to justify, or militate against, the logic of an alcohol fuels program per se.

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IV. THE ENERGY EFFICIENCY OF GRAIN ETHANOL PRODUCTION

One of the two basic assumptions of this paper is that the overriding objective of a U.S. alcohol fuels industry must be the energy-efficient production of priority liquid fuel to replace foreign sources, and therefore that Government incentives to support a fuel alcohol program should be structured to assure consistency with that goal. As a practical matter, this means that the program should be required to yield more priority liquid fuel than the priority fuel which it consumes in the production, assembly, and conversion of the feedstock to ethanol. "Priority fuel" in this context includes all fuels derived directly from crude oil and natural gas.

Clearly, it would not be advisable to implement a large-scale government supported program for the conversion of agricultural products to ethanol unless it can be shown that the program results in a significant net gain in priority fuel supply. The difficulty is in defining the concept of "net energy balance" in a way that can be sensibly applied to proposed alcohol fuels policy options.

Table 9 indicates three ways to derive net energy balance estimates in regard to fuel alcohol production.

Table 9

Net Petroleum Balance of a 1 Billion Gallon Ethanol Program

Distillation Technology	Net Reduction in Petroleum Imports (million bbls.)
Case 1 - Present	Negative
Case 2 - Renewables/energy efficiencies maximized	Minimal, or questionable
Case 3 - Coal	850 1/

1/ Assumes that DDG replaces soybean meal, and the energy required to produce and process the meal is credited in the energy balance.

Case 1 reflects the oil and gas use levels commonly required in present-day alcohol distilleries. To pursue this approach would actually increase petroleum imports. Of course, the existing distillery industry was not constructed with a gasohol market in mind or with explicit attention to minimizing priority fuel consumption. Most of the existing industry, in fact, consists either of plants utilizing a priority fuel derivative as feedstock (ethylene) or small plants using oil or gas which serve regional beverage markets. Many plants are old, and do not embody the state-of-the-art in conversion technology.

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Case 2 reflects an approach designed to improve the priority fuel energy balance by emphasizing the use of renewable (non-fossil) sources of energy for production and distillation and by maximizing the energy efficiency of the distillation technology.

Section 1420 of the 1977 Food and Agriculture Act, for example, provided that no convers on plant project could be considered for a Government loan guarantee unless it was demonstrated that the project would produce an amount of energy in excess of the fossil fuel used in the production and conversion process.

Given that requirement many of the proposals received by USDA consisted essentially of conventiona distilleries with proposed utilization of forestry and agricultural residues (e.g., corn stover) or solar and wind power systems designed to reduce fossil fuel usage and thus to satisfy the energy balance requirement. However, few if any of these systems currently pass the test of commercia economic feasibil ty For example use of corn stover and simi ar crop residues to provide the process energy requirements of arge scale dist eries appears attractive on the surface, but appropriate technology does not yet exist to permit the economic gathering, compacting, transportation, and storage of such materials. Furthermore, it is questionable whether, from a practical standpoint, it makes sense to provide Government support for an alcohol distillery which shows, on paper at least, a minimally-positive fossil fuel energy balance based upon the above types of systems--a positive balance which may dissipate during implementation of the project.

Another dimension of this approach is to place emphasis upon maximizing energy savings that can be achieved with heat exchangers and other available technology. The positive results that can be achieved remain highly problematic at this time, however, particularly if the increased capital costs (and thus ethanol production costs) are simultaneously considered and weighed.

Case 3 is based upon a direct linkage with national coal conversion policy, in the sense that any additiona Government incentives for a fuel ethanol industry (such as assistance for disti ery construction would require that coal must be used for raising steam and prov ding other in-plant energy requirements. As indicated by Tab e 9, this approach would yield a strongly positive net priority fuel energy ba ance while allowing the use of petroleum-based fuels and natural gas (as feedstock for nitrogen fertilizer) in producing grain feedstocks since alternatives to such uses are generally infeasible. The use of coal for in-plant energy need not increase long-term ethano manufacturing costs substantially, provided that disti leries are ocated so as to hold down plant emissions problems and coal transport costs.

This third approach seems clearly preferable under present conditions. If an industrial-sca e government-supported program for the conversion of agricultural products to ethanol were to be authorized at this time, it would seem highly advisable to include an unambiguous statutory requirement that coal be used in lieu of any priority fuel for in-plant energy. A decision

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to constrain eligibility for government incentives to projects using coal would also necessitate explicit concilliation of gasohol policy with other major elements of national coal conversion policy and national energy policy.

If legislation was passed providing substantial governmental support for a nation-wide gasohol program without a requirement to use coal rather than priority fuels, the private sector will tend to build distilleries relying on petroleum or natural gas for process energy requirements. The capital requirements for alternative fuel systems (including coal) are higher than those based on oil and gas. Given present interest rates and capital stringency, most firms (especially new entrants) would probably prefer to pay somewhat higher current energy bills rather than to raise additional start-up capital and to pay substantially higher debt service bills.

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Mr. ROSE. Thank you.

Mr. Bedell?

Mr. BEDELL. Thank you, Mr. Williams. I appreciate your testimony. You have attached to your testimony, I see, some information which was given out at the hearings that were held over in the Energy Subcommittee.

In my talks with you I questioned many of the figures that were given in that material. I assume you have not had time yet to check those out. Is that correct?

Mr. WILLIAMS. Yes, sir. The attachment that we have here does address the demonstration project in Kentucky that you referred to on the use of distillers dry grain with solubles being 1 or 2 percent higher feed gain on cattle in the lot. I have asked that be reviewed, and we have done some work on it.

In addition to that, I tried to reference principally for you and the committee all of the agricultural projects that are underway in which we are studying the DDGS as a feedstock and also to highlight all agricultural experiment station work and State research work that is going on in the country.

It is sort of an update of all of the technology that I could pull together.

Mr. BEDELL. If those studies that were done at Kentucky can be confirmed, and they can be confirmed in other studies—I understand there is a good chance they can—then if indeed the feed stock is as valuable a feed as the corn that you put into the original process, then I presume that the Department would agree that the problem of the price of corn becomes irrelevant because the value of the distillers dried grain is as great as the corn going in, whether corn is 50 cents or $5 a bushel, you still have the same value from the byproduct. If that is confirmed, would you agree with that?

Mr. WILLIAMS. Yes; I would. I would hasten to add, however, that I think it would be best if we could get somebody from the science side of the USDA to come and to testify on the results. Perhaps by tomorrow, if it is possible to get one of the witnesses before the committees, it would be a good thing. I will be happy to try to get whoever is in the country who can testify on that point. I feel inadequate only having read the brief resumes of what all of these reports have indicated to comment other than I have.

Mr. BEDELL. Yes. I also asked you about the capital recovery thing on page 9 of your table. This seems to be unbelievable. Were you able to check that out?

Mr. WILLIAMS. Yes; I think Mr. Barton can answer that question. We have provided your office, I believe either last night or early this morning, a breakdown of that 32 cents per gallon cost of recovery for debt retirement.

I would like Mr. Barton to respond to that.

Mr. BEDELL. I don't know if we have to take committee time. As long as you have the information available so we can look at it, that would be fine.

I guess the main thing that I would like to do is this. I am pleased to see you involved in this. I think it is only fair for me to say that I do not believe that the Office of Energy in the Department of Agriculture has been objective up to this point in review-

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ing this. Certainly your statement would indicate that there is going to be an effort to try to be objective. That is all I ask. I ask objectivity. Frankly, that is all I ask in this issue.

I think the people are pretty well aware that we passed in our farm bill last year an amendment, the Thone amendment, which he even said in testimony was a gasohol amendment. The four projects were awarded and none of them were for gasohol, or for ethanol for gasohol production.

Our whole effort is to try to get the Department to be objective and to look at this in an objective way. I believe the testimony that we are going to have from the people here during these 2 days will show the viability of an alcohol fuels industry. I would further hope that at least some of your people will stay here for that testimony because I believe it will be enlightening to them at least hear the testimony and have those contacts.

Mr. WILLIAMS. I will ask Mr. Barton to remain through the entire hearings today and tomorrow. I met yesterday afternoon with some people from DOE, and I asked them to monitor this meeting this morning. USDA's position is that we are working closely with them, and I can assure you that both those departments are determined to do as best we can to be positive in approaching this whole process.

We all recognize the need for alternative sources of energy. This is a legitimate way to approach that problem, and we want to be positive in every way.

I would like to add one comment, if I could, Mr. Chairman, and Congressman Bedell.

I want to be absolutely candid. I think the subsidies that are outlined, the 4 cents a gallon and the 20-percent investment tax credit, offer great incentive to the private sector. Where it is economically feasible and when the technology is there to move in, I think it is good.

I have some grave reservations about USDA's involvement in the bill, specifically with reference to the $600 million matching money. We are really not very well staffed in USDA for making the determination whether or not it is an energy efficient operation.

While I did not touch much of your legislation, it would be both the Secretary's and my commitment to you that we will try to work together to see if we cannot put the bill in the form that we all can be very supportive of.

With that reservation, Congressman Bedell, I pretty much followed up our conversation of last week.

Mr. BEDELL. I appreciate your cooperation in that regard. I am pleased to see what I detect is a change. I hope I am correct in that regard.

We have felt that the Department of Energy was much more cooperative and interested in trying to get help with the ethanol production for gasohol. Frankly, we were extremely disturbed that the Department of Agriculture, which we thought should have a greater interest in helping to move this, seemed to be dragging their feet.

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I am delighted if what I detect is correct. We certainly want to work with anybody. I don't think anybody in the Congress wants to push something that does not make sense.

By the same token, I hope we would not forget the fact that most of our previous energy sources were started, to a great extent, by encouragement by the Government. When we have the serious national problem that we have at this time, I think for us to sit back and say that we should not be involved in it in any way and ought to leave it up to private enterprise is a bad position. I have difficulty with that.

Mr. ROSE. Excuse me, Mr. Bedell.

Mr. BEDELL. I yield back my time, Mr. Chairman.

Mr. ROSE. Mr. Williams, who is the Department's authority on gasohol?

Mr. WILLIAMS. We have an Energy Office which is directly related to the Secretary's office. Dr. Weldon Barton who is here today is the head of that Energy Office.

Mr. ROSE. Dr. Barton, what is the position of the U.S. Department of Agriculture on gasohol?

Mr. BARTON. Congressman Rose, let me make a comment. Maybe that is a better question for the deputy to respond to.

What we tried to do in the backup report which we have submitted is to provide a balanced and objective look at the question and an examination of some of the questions and problems for agriculture in particular. We tried to do this in a way that would not scuttle the gasohol program but would allow a positive response and provide a basis for working out these problems and questions.

For example, there has been some attention given to the base case chart as to how much it costs to produce gasohol and fuel ethanol. Our primary intention, including that chart there, was to be able to take off on that and say that there were some things to be worked out on the distillers dried grain and the corn gluten meal and the byproduct mix. If they are worked out effectively they can help to support and make viable a gasohol program.

Also, there are some things to work out on the fluctuations in corn prices that can destroy a gasohol program, that is, if we do not respond to them in the most appropriate fashion.

The Deputy Secretary has indicated some of the suggestions that we have made for dealing with those. For example, trying to maintain the reserve program in such a way that you can stabilize to some extent the feedstock costs and reduce some of the fluctuation and input costs.

Generally speaking, I think our position in the Department—and the Deputy can speak to this—is that we want to be positive in this program. We want to support the President's initiative here.

Earlier in Des Moines, Iowa, on the 5th, we said this. The question is how do we best respond to agricultural policies and measures. Let's say feedstocks, primarily. We want to support that effort in a constructive way. I think this is perhaps a little long in response, but that is essentially the approach we took.

Mr. BEDELL. If the gentleman will yield, let me say this. The problem I have is this. I don't think the report is balanced or objective, personally. I can go over the details if you want me to. However, my personal opinion is that this was not the case. This is

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part of the objection I have had in the past. I detect maybe a change which I am most hopeful with.

Mr. ROSE. I am still not sure I have gotten an answer to my question. I will live and learn around here.

Does the Department of Agriculture believe that the technology exists to produce gasohol in a way that it is a useful producer of energy or is the distillation process of alcohol itself so consumptive of energy that the product is a new loss in and of itself? Have you examined that?

Mr. WILLIAMS. Let me answer that. You have to be very definitive about the process. Let me tell you of my trip to Decatur, Ill., to Archie Daniel's Midland. It is a positive energy producer. It is very different, though, than the operation they previously operated for only making two products, distiller dried grains as a byproduct, and alcohol as the other product. That is a simple distillery.

What they are now doing is making four products. They go with a wet grain operation on corn on the front end. They separate the components of that kernel of corn, that particular ear of corn, into several products. One is that they remove the germ out of each kernel. They take that across the street and they compress it to get oil out of it—about 1.68 pounds of oil. They take the starch out of the 56-pound bushel of corn which is 32 pounds. That starch is all that is used for making alcohol. They make a 60-percent corn gluten meal out of the residue and that goes to the poultry and the dog food industries, domestically. They take the remainder which is 21-percent corn gluten meal and ship it to Europe for principally the feed business. It is energy efficient. It could be more energy efficient if they were able to also capture some gas that escapes from that operation and convert that.

They told me that when they operate it as simple a distillery that they used about roughly—and these figures are somewhere that we can verify—but about 130,000 Btu's. They produced about 85,000 Btu's per gallon of alcohol.

Mr. ROSE. Would you repeat that again?

Mr. WILLIAMS. They were using in a normal distillery more fuel than they were producing in Btu's from the alcohol that was produced.

Mr. ROSE. Then how can you say it is efficient?

Mr. WILLIAMS. It is not, and they have abandoned the distillery process and gone to this much improved process which involves the byproducts. When you consider all the byproducts and the energy used to make the byproduct, it is energy efficient.

In fact, the cost of their starch that they make alcohol from is reduced from $2.50 a bushel when all the other products are taken out of it down to 85 or 90 cents a bushel for that starch. So, they have an entirely different set of economics than when you use the entire corn to make alcohol and only have one byproduct which is the dried distillers grain.

I am here today because we want to be supportive of the gasohol program. We want to be a part of designing how the policy of this country will be.

I am an optimist. I am very sure that there is the technology. There is nothing new about it. It can be improved. It can be more energy efficient than it has been.

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One of the things that perhaps needs to be addressed by the committees in the final analysis is the feedstock issue because corn is one of the items. There are many others that I refer to in the pilot study. There are waste products from garbage, from sewage, from animal waste and feedlots, from pig operations and chicken farms—all of those are alternatives.

The problem I have at the present time is that there also has to be some concern about the fuel you are going to use to dry the products and to provide process heat for distillation, that is, whether you are going to allow it to be done from oil and gas in order to make a product that replaces oil and gas or whether there should not be some government incentive on the front end to use an alternative source of heat so that you have a very high surplus of energy replacement against the imported oil.

Those are the questions that we raised. We raised them in a positive vein. We will work closely with the Congress and with Congressman Bedell to try and reach some solutions.

Mr. ROSE. Mr. Williams, I appreciate that comment. My concern is this. The American people in large numbers seem to believe that the Government is not doing all that it can to help develop and encourage the development of alternative sources of energy.

Some people even write me convinced beyond the shadow of a doubt that the Government, the oil companies and the automobile manufactureres are in sort of collusion to increase the prices of liquid transportation fuel to the American public. I am not so convinced.

However, I believe the technology is out there. If we study it, and if you and your staff and the people in your Energy Office and the Department generally become as thoroughly acquainted with this as they can, and encourage this technology and explain to the Congress what we can do to help, then I think that would be the way to go. If you need assistance from the grain subcommittee, then we will give it to you. If you don't have sufficient authority, we will give it to you. But you sound like you are sensitive to the economics of this.

I do not know of a subject that we are more concerned about on these subcommittees than this.

I appreciate your being here.

Let me recognize Mr. Sebelius.

Mr. SEBELIUS. I appreciate the chairman's comments. I have one question.

We have an amendment in the full committee now. It is an amendment to the rural development bill which goes beyond the amendment that we had before, and as Mr. Bedell has said, we are already disappointed how these products were selected.

There is an amendment in the full committee which has been adopted that authorizes $180 million for additional guaranteed loans. That is one actual provision.

None of the loans that were made were specifically for gasohol so Mr. Bedell put in an amendment that provides alcohol fuels so that the main thrust of the new guaranteed loans would be for the technologies that would produce the alcohol, basically for fuel, but then your other byproducts would go that way to make it more feasible.

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I was wondering if the Department would be willing, at this time, to comment on that $180 million guaranteed loan authorization that is in the bill that is now in the full committee?

Mr. WILLIAMS. I am not familiar with it. I will see that I am apprised of it. I will provide it for the record, if you will allow me. I will research it today and by tomorrow before your hearings close I will be happy to supply you with a statement.

Mr. ROSE. That will be fine.

Without objection, the record will remain open at this point for the purpose of inserting this additional material.

[The following response was received:]

The material requested is not provided, because the administration's position has not yet been clarified on this item.

Mr. SEBELIUS. I appreciate that. Let me associate myself with the chairman's remarks about the fact that we want the Department of Agriculture not to be so defeatist. It takes more Btu's to produce the gallon than we are using up in fossil fuels, so we have to have new technology if we are really going to bust out of this problem. I appreciate your comments. I hope we can work as a team to go forward in this field.

Thank you, Mr. Chairman.

Mr. ROSE. Thank you, Congressman Sebelius.

We have our colleague and member of the committee, Tom Hagedorn, and our colleague, the Honorable Virginia Smith, waiting to testify.

Do the members of the committees wish to direct any more questions to Mr. Williams?

Mr. Hance?

Mr. HANCE. I will be very brief. I would like a commitment from Mr. Williams and the Department of Agriculture that you will continue to be cautious in any type of statement that you make on gasohol. The public is so hungry for answers to the energy crisis that they get to hearing about gasohol and solar energy, and they think they will solve everything next week.

The truth of the matter is this. We are having projects that might cost more to produce what we are producing and so it does not make sense then.

So, let me tell you that I think you need to be very cautious so that you don't mislead the public.

Mr. WILLIAMS. If we have been criticized for anything, it has been for our cautiousness.

Mr. HANCE. Yes, I understand that. I want you to continue to be cautious. I hope that the breakthrough comes in a short period of time. We may be around the corner. However, at the same time I think there are too many statements made that the general public would rather believe that the problem could be solved next week. The energy crisis is not as bad as the public thinks. It is worse. We have got to solve it, but at the same time the public should not be mislead.

Mr. WILLIAMS. I could not agree with you more. We are looking at a limited alternative source of fuel in the foreseeable future in gasohol, but we do need to make that step. It seems to me that we have outlined it about as well as we know how.

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Mr. HANCE. I support the bill.

Mr. ROSE. I thank the Congressman from Texas, and I yield to the Congressman from Illinois.

Mr. FINDLEY. Thank you, Mr. Chairman.

Decatur, Ill., is a few miles from my district, so, Mr. Williams, perhaps I am more aware of some of the amazing progress that ADM has made.

In your testimony you pointed out that they have found a new process for the production of alcohol which perhaps can be still better if they can find a way to capture the gas which is produced in the process.

What completely mystifies me is why the Department of Agriculture, having had the authority for four pilot research projects in gasohol, has selected only two of them and neither of the two is really to the production of alcohol or from grain. Gasohol had its origin from grain-producing areas, the great heartland of the United States. The Department, having been given this authority, still has not selected out a pilot project which is based on grain production of alcohol.

Here, by your own testimony, you have cited a need for research—the capture and utilization of the gas that comes from the new process that ADM has developed.

I am informed that ADM made a proposal for a pilot research project using grain as the base, as the raw material for the production of alcohol. If you could shed some light on why the Department has not acted with dispatch, having been given this authority and given the political atmosphere, then I would appreciate it, and I am sure everyone else would too.

Mr. WILLIAMS. I think even Congressman Bedell would agree that the best alternative is to use that part that has very little value or is a waste part. I think that is the answer to it. There is no lack of technology on the issue of gasohol.

Mr. FINDLEY. But here you have authority for two additional pilot studies. They are not even authorized. They are lying there idle. I would think you would move forward with those two.

Mr. WILLIAMS. Let me have Mr. Barton respond to this. I got here 3 months ago. One of the things we have done is this. I thought the fourth of the four projects that were authorized by Congress had been approved, as a member of the board of the Commodity Credit Corporation—is that correct?

Mr. FINDLEY. Before Mr. Barton speaks, let me make this other comment.

As you examine the cost-effectiveness of grain production of alcohol, you have to take into account the enormous outlay of U.S. taxpayer money for grain price support programs. Here we are spending millions for farmers not to produce grain and grain can produce energy. It seems to me to be a total waste. I think that has to be taken into account.

Mr. BARTON. Let me say briefly, Congressman Findley, that the CCC board has approved, tentatively approved, all four of those pilot projects under section 1420 of the 1977 act.

Mr. FINDLEY. You refer to two in your statement, however.

Mr. BARTON. Yes. I am sorry. Maybe that is misleading. The Deputy Secretary referred to four projects for $42.7 million, two of

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which were fuel-grade ethanol projects. The other two were using forestry residues or wood pelleting operations.

As you will recall, the 1977 act provision provided for the use of agricultural commodities and forestry products. As it came out, the CCC board approved two projects in the forestry area, the ENERCO incorporated project and the guaranteed fuels project for the pelleting of wood.

Then there were two in the ethanol area from agricultural commodities. The Savannah Fuels/U.S. Sugar project, to use sugar cane stalks——

Mr. FINDLEY. All four, then, are being utilized?

Mr. BARTON. Yes.

Mr. FINDLEY. But none is using grain as the base.

Mr. BARTON. But the fourth one, the Midwest Solvents project for the plant in Santa Rosa, Tex., will use about 80 percent grain sorghum. It will not use corn, but it will use 80 percent grain sorghum as a feedstock. So, it will be using predominantly a feed grain as the feedstock for that particular project.

Mr. BEDELL. Will the gentleman yield?

Mr. FINDLEY. Yes.

Mr. BEDELL. It is correct that none of those four are for gasohol; right?

Mr. BARTON. The two ethanol projects will produce fuel-grade alcohol and will result in sales, as they can sell in that market, of gasohol. They can also sell the ethanol as industrial ethanol if it is to be economically feasible.

Mr. FINDLEY. I can say accurately, I think, that this authority for pilot projects was intended to promote and advance the cause of gasohol. The handling by the Department of this opportunity lends weight to those who criticize the Department for foot-dragging on gasohol. This provides you with an opportunity to set the record straight.

Mr. ROSE. Thank you, Congressman Findley. Mr. Fithian.

Mr. FITHIAN. Thank you, Mr. Chairman.

Mr. Williams, I have been involved in this for about 3 years, that is, in this particular thing. I am frustrated this morning to try to compress my feelings and views into the 5 minutes allowed me.

I must say at the outset that I believe there is a rather serious division of opinions, if I read it correctly, between Dr. Barton and his crew in the Energy Division, and Secretary Bergland.

The Secretary was kind enough to come out to my district and review the most startling breakthrough in the whole field in the United States—the conversion of cellulosic agriculture residue to ethyl alcohol.

I will not take time to summarize that for you. I would only ask that, because I do not believe that the people in the Department of Energy or the Division of Energy at the USDA are seriously oriented toward taking these matters at their economic value and really working on them, if I provide you with a study will you personally read it? Would you than personally discuss it with the Secretary? I am not talking about a 1,000 page study. I am talking about 15 or 20 pages.

Mr. WILLIAMS. I would be happy to.

Mr. FITHIAN. Thank you.

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Also, if I provide you with another study that was done—and it has been carefully done by agricultural economists at Purdue University—comparing the cost of our present farm program with the alternate cost of taking all excess grains and converting them to usable fuels and which comes out demonstrating clearly that it is cheaper as a national policy to take those extra grains and convert them, then would you look at it? The summaries are brief. Would you read that. Would you discuss that with the Secretary, bypassing your Energy Division?

Mr. WILLIAMS. Yes.

Mr. FITHIAN. This is nothing personal with Dr. Barton. I have talked with him before. I have worked on this for some 3 years now. I have reached a kind of a final frustration with the Department in the whole matter.

I do not know whether you are aware of it or not, but there are 1 million tons of cellulosic waste—we call it waste—that we are trying to get rid of every year in this country. All of that under the new process which has been developed and which is the most startling process in cellulosic chemistry, I am told by Betell who evaluated it, that has been discovered since the discovery of that field—all of that can be converted to ethyl alcohol. It could make a significant difference to farm economics. The economics are that after the grain is harvested then whatever is done with this grain—you can pay $30 a ton for the stalks and the residue which are unneeded and convert that to ethyl alcohol.

I am talking about some things that are sufficiently startling that I am surprised that people who have done it the old way for 15 years are unwilling to think new thoughts. I hope we can find through you, or through someone who would focus on it, a fresh view.

Let me toss out one additional item which is not your responsibility but it is a national responsibility. Every ton of city garbage that we try to burn, or buy, or compress, or do away with contains, on the average, 57 gallons of ethyl alcohol.

To my knowledge, the Department of Energy and the Department of Agriculture—the two that ought to be working in tandem because we are talking about cellulosic waste primarily, whether it is city garbage, corn stalks, wood chips, or whatever—have not seen fit to do this. Perhaps there is pressure to go in too many directions. But they have not seen fit to bring these two thrusts into some kind of rational national policy.

I do not have the encouragement that Congressman Bedell has about the Department of Energy. I find them just as resistant to new ideas as the Department of Agriculture.

So, I have carried on a kind of single-handed operation on my own that has led me to one frustration after the other with our own Division of Energy at USDA and the Department of Energy. I am just looking for someone in the position of policymaking authority who will take this and give it a serious look.

I could go on at some great length about the economics of it and the energy efficiency of it, but my time has expired.

With your commitment to look at those two, I will personally commit to get them to you directly, and then I would like to have

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you look at them and talk with the Secretary. Then sometime at your convenience, I would like to talk seriously with you about it.

Mr. WILLIAMS. Mr. Fithian, I would welcome that opportunity.

Inasmuch as I was not confirmed through the House, I would like for the committee to know that I have been involved in this energy business for a long time also. One of the real frustrations of my 10 years of public service in Florida was to serve on an energy committee in 1973 and 1974 when the first OPEC embargo happened. Then I was Lieutenant Governor of that State for 4 years. I wanted to see some alternative sources of energy developed. Frankly, very little of a research and development program or anything that I felt was positive has come out.

I am pleased to be here. I supported, back in those years, the now deceased Nelson Rockefeller's proposal for a $100 billion program in research and development. I am convinced that we do need, in fact, more research and development.

However, there is a tremendous amount of technology already available. It is not where we would like it to be in many instances. Every ethanol plant that we could build is not strategically located for some future development.

However, I would leave a bad impression on the committees if I were to say to you that I think a great number of ADM mills can be built in this country. I think you have to have an awful lot of capital investment. You have to have foreign markets. Those people have barges going down the Mississippi to their port in New Orleans and sales offices around the world. It is not a simple matter for the average person in the corn production to be able to market the way they do.

It would take an awful lot of improvement to think in long terms about using only corn to meet energy needs. Cellulosic material and waste and sewage offer an exciting potential. I visited Beltsville personally, 2 weeks ago, to see what we are doing with raw sewage—that is, sewage treated here in Washington, D.C. We are working in Maryland, where we are composting 60 tons a day. Part of the composting generates 170 to 190 degrees of temperature that is not being used.

So, there are a lot of ways that we need to improve these technologies, but I am ready—and I am sure the Secretary is and the Department is—to move ahead with the best thought-out plan that we can, recognizing that the technology is going to improve. I do think, however, that we have to insist that we look at the alternatives as to what the net energy production is from the various processes being considered.

Mr. FITHIAN. The technology and the advancement of this whole matter, of course, with Brazil leading the way, leaves some of us a little disturbed. We just wrestled with the sugar bill here. There was great consternation about whether it would be one half a cent or three quarters of a cent.

The process applied to bagasse makes from 1½ to 2 cents a pound difference value equivalent in sugar. This is just to show you something of the dimension of what we are dealing with here. It is that kind of comprehensive view that we are seeking.

Mr. WILLIAMS. I asked yesterday about this. In the Secretary's absence, I hosted a luncheon with a grain-buying team from Brazil.

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I asked for some direct information on what they are doing in the way of gasohol.

They have done some rather remarkable things. They stressed very quickly to me that they were not in quite the same problem that we are here. They were operating in a milder climate for the most part with the gasohol operations. They were getting by without having to have an anhydrous product, with all the water removed.

The normal distiller removes most of the water and gets the alcohol to 190 proof, leaving about 4 percent water by volume. ADM's operation is an anhydrous operation. It removes the last 4 percent. The technology on how it is used is important.

I have asked the Brazilians to give direct information to USDA, and I will be happy to share that with you as soon as I receive it.

Mr. ROSE. Thank you very much.

Mrs. Heckler?

Mrs. HECKLER. Thank you, Mr. Chairman.

Let me pursue the same issue that Mr. Fithian raised. I am very interested in the development of gasohol. I think that, aside from the obvious limitation of our resources, the growing sense of rage in the American public and the people's sense of frustration demands that we not only continue our research and take a hard look at gasohol but that we take a practical look as to how we can implement some of the research that has already been completed.

What bothers me is this. It seems that we are researching the subject to death while the crisis grows larger and larger. Research is consultation without end—commissions, reports, studies—but virtually no action.

I am particularly familiar with—and I am supportive of the use of gasohol from grain and from sugar—but I am even more familiar with the urban waste development as an ethance source. I have worked on the funding for this for 4 years for the U.S. Army laboratories in Natick, Mass. under the direction of Leo Spano. The process produce ethanol from urban waste—cellulosic material. Frankly, in my section of the country the disposal of waste is a major problem as it is in all urban areas. The country is spending $4 billion annually to get rid of urban waste.

I feel that while we must accelerate the responses to the gasoline shortage in the form of increased production of gasohol from grain, we should also build on what we have already learned in terms of conversion of waste.

What disturbs me is this. As outstanding as the Natick laboratories have been their story still needs to be told. In March of this year—I would like Dr. Barton to be aware of it because I don't know if he received the study or not—the National Academy of Sciences cited this particular laboratory and their work as being the foremost in the development of this cellulosic conversion of ethanol.

We are all familiar with what the Brazilians have done, but despite the fact that the National Academy of Sciences has said that development of this process is in the national interest and that it is essential that this development be pursued, the funding for the second stage of development has been slow in coming and is not forthcoming at this moment.

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A laboratory that has exceeded its capacity and exceeded its expectations and is scientifically sound is dead in the water waiting for some development or from support from the Department of Agriculture or Department of Energy. At the same time the Agriculture Department is pursuing the study of energy and considering other technologies and while ignoring the one laboratory in the country that world experts have acknowledged to be the most advanced and foremost.

I do not have a question, but I would like to submit to both of you the report of the National Academy of Sciences. I would earnestly ask for your reconsideration of where we are going. If we are going to reinvent the wheel on gasohol, then we are dealing with the gasoline shortage for the next 10 years.

There are very, very dynamic developments taking place in the public sector. At this morning's breakfast on gasohol, I spoke with a gentleman from Baltimore who is already working on a process of commercialization. He is waiting for the final development of the product from Natick Laboratories and Natick Laboratories has been ready to proceed for more than 6 months with the scientific team that is recognized and distinguished. Yet, they have been unable to go ahead because they have already exceeded their production capacity for this development phase.

The next stage of development for scientific credibility requires some funding and they have not gotten the go ahead from the Government. I cannot understand the reason why.

Mr. ROSE. Thank you.

We need to move along with our other witnesses, if we can. Mr. Jeffords.

Mr. JEFFORDS. I have had an idea which is gaining some support in other areas. I was concerned when I saw the President's decontrol program about what the marginal cost per barrel would be for the additional oil produced as a result of decontrol. The figures estimated range from $40 a barrel, which was Mr. Schlesinger's low estimate, to over $100 a barrel. Comparing that with the present cost of alcohol and replacement fuels from other sources and so on, I think we should give consideration to replacement fuels.

I have a bill that is gaining support. It would mandate the country to go to a 10-percent replacement of fuels over the course of time and make the industry do it by telling them that they must, between now and 1985 or 1986, replace 10 percent of your gasoline with a replacement fuel. Either alcohol or gasoline from coal, or whatever, would be appropriate. This would put the burden on the industry itself to come up with the answers and require them to replace gasoline.

My proposal would do more than the President's program which optimistically would replace or increase production, rather, by some 750,000 barrels a day. If you require a 10-percent replacement, you are up to 800,000 barrels a day and you are going to end up with an answer to our Nation's problems rather than draining America dry first and faster which is the President's program.

I wonder if you have given any consideration to this. Senator Church has a bill on gasohol on the other side of the Hill. How about this as an answer?

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Mr. BARTON. Let me comment briefly on that. Yes, we have looked at that type of approach.

In our analysis we limited our assessment to a range of possible programs between half a billion and 2 billion gallons of ethanol. This would incorporate, for example, the size of program that Congressman Bedell has advocated in his legislation.

This size of program initially would impact the protein market and the distillers dried grain and if you went to a larger program initially the impact would be greater. If you phased in a larger program over 10 or 15 years, then perhaps that would be appropriate.

However, we think you would engender great impact and opposition with the large program even if you provide a 10-year staging period before reaching a full 100 percent nationwide gasohol program.

This would be in contrast to Congressman Bedell's approach which we called an incremental approach. In the incremental approach you would go to 10 percent or 20 percent gasohol program initially. Then 3, or 4, or 5 years from now you would be in a posture where you could look at what that is doing in terms of grain supplies and so on. You could move from there.

However, the approach that you advocate, Mr. Jeffords, and the approach in your legislation does have the advantage that you outlined of trying to get around the question of cooperation from the oil industry. If you could achieve that, then that would be another way of going.

I might add just one thing in this regard. This is in connection with Deputy Secretary Williams' comments on ADM. You do have, in a sense, an alternate way of working with the food processors to build the marketing networks and to develop and use the byproducts. This kind of program could be viable.

So, there are various approaches. There are merits to your approach, Mr. Jeffords, as well as others.

Mr. JEFFORDS. Thank you.

The bill I have does not just include gasohol. It includes synthetic fuels. I have had witnesses from the synthetic fuel industry who believe that they can produce on schedule, especially in combination with what could be produced locally with alcohol and that they could meet a 10-percent figure by 1985. There would not be too unreasonable demand on capital, they say.

Thank you very much, Mr. Chairman.

Mr. ROSE. Thank you very much.

Congressman Hagedorn, would you be content, sir, to have testimony and questioning at the same time, or how do you want to do it?

Mr. HAGEDORN. Mr. Chairman, I don't want to take too much time with questions. Let me ask Mr. Williams one question.

When you compute the energy type used for conversion into grain alcohol, do you generally consider using liquid fossil fuels, or are you considering using coal and other resources that I think have less value in the marketplace today?

Mr. WILLIAMS. That is not a decision that we will make.

Our strong advice to the committees is to direct government policy toward getting as much energy surplus in the operation as

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possible. I would not support—and I don't think the Department or the Congress or the Secretary should support—a program that simply nets out a 1 for 1 energy balance where you make no more fuel than you actually use in the process.

Mr. HAGEDORN. I think that is a concern that most of the equations are based on, that is, using the liquid fossil fuel as a conversion source. One-thousand Btu's of oil is certainly worth a lot more than 1,000 Btu's of coal today. I think if we use alternative sources we find that the favorable factors for gasohol increase considerably.

Mr. ROSE. Mr. Hagedorn will be our next witness, but Mr. Williams, let me close by saying this to you.

Agriculture has developed into a very energy intensive business. It occurs to me—and I think to most of my colleagues on the Committee on Agriculture—that we should be doing two things. The Department should be exploring as rapidly as it can ways to decrease the current dependency of agriculture on fossil fuels and, at the same time, as rapidly as we can seek to provide for agriculture itself other sources of fuel such as gasohol.

If we did nothing more than give the producers of our food and fiber the tools with which they could produce the energy they need to run the farms of America, I think that in and of itself would be a great reason to put all of the efforts that we can in this direction.

I think the American people are demanding that we increase our vision and that we increase our creativity and that we look in corners that we have not looked in before for answers. I think all of those things need to be done. I think that farmers, as well as the American people need to learn to be less energy dependent. We need to learn to be more self-reliant in our consumption.

Clearly, agriculture is the place that sort of economy needs to be started because they are the producers of the Nation's food and fiber.

I appreciate your interest, Mr. Williams. I am sure you will be delighted to know that this bill has attracted the attention of many friends of gasohol and one noted friend of the Washington bureaucracy, columnist Jack Anderson, who will be here testifying tomorrow about his observations. I am sure that he will help all of us air the pros and the cons of this debate.

We thank you both for being here. I am sure you will see us again on this subject.

Mr. WILLIAMS. We are delighted, Mr. Chairman.

Let me add one closing comment.

The one other fact that I picked up—and I hope it is a fact—as I have traveled around and particularly to ADM's operation is this. They had been told by one of the major oil refineries that if the gasohol were available at the refinery rather than at the gas pump that they could increase their capacity at the refinery by some 7 percent. That is a figure that I throw out to these committees for their ability to check out. However, it would make a tremendous impression if we had the cooperation of the oil companies at the refinery level so they did not have to crack their gasoline at a higher temperature to get the octane by the additive of gasohol or the ethanol at that point.

It is a fact that I cannot substantiate, but it is one I hope the committees will pursue.

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Mr. ROSE. Thank you.

Our next witness is Congressman Hagedorn, a member of the Agriculture Committee.

STATEMENT OF HON. TOM HAGEDORN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MINNESOTA

Mr. HAGEDORN. I commend the efforts of the three subcommittees which are holding these important hearings to consider bills designed to promote production of motor fuel blends of gasoline and alcohol produced from agricultural products.

The Department of Agriculture will play an instrumental role in the implementation of the gasohol-promotion legislation which may be enacted into law and I have listened to the comments with a great deal of interest this morning.

I have a prepared statement on gasohol, however, this subject is so important to me and the citizens of the Second District of Minnesota and the Nation that I would like to take a few minutes to summarize them for the members of the subcommittees.

The gasoline supply situation at present and for the foreseeable future demands that some positive action be forthcoming from the Congress. The action by these three subcommittees is an indication that something can be done to help cut back American dependence on imported petroleum and that alcohol-based fuels can make an important contribution toward this goal.

I am a long-time supporter of the production of alcohol from grain products for use in making gasohol. Those of us from the Midwest have realized for years that this product works toward saving gasoline and improving engine performance. This realization is rapidly spreading.

The President has recently announced that his administration will do more to increase the number of alcohol production plants. This is the first important step toward making gasohol available on a nationwide scale.

Throughout these hearings you will hear many comments regarding the usefulness of this product. Some may say that the high cost of alcohol production makes it prohibitive as a source of energy. This doubt will surely disappear as gasoline prices continue to increase and alcohol prices remain relatively stable because of increased alcohol production.

As members of the Agriculture Committee concerned with gasohol production, we are looking to the future. The increased gasoline and gasohol supplies will then depend on what action we take now today.

I predict that future energy prices will soar much faster than farm prices, unfortunately. It is for those reasons that I have become such a strong advocate during the many years previous.

Those of us who are from the Midwest, as I stated earlier, and who have used the product strongly believe in its merits. What is needed are ways to broaden the market beyond this area. We need a national commitment toward greater use of present crop production, especially excessive production, and increasing ethanol-production plant facilities, and insuring a dependable and efficient national distribution system for gasohol.

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Several of my colleagues have joined me in introducing different bills which collectively deal with all of the various aspects of the alcohol-from-agricultural-products production program. I sincerely hope that the result of these hearings will be comprehensive legislation that will address all aspects of the gasohol situation.

The year 1980 is in the future. My gasohol promotion bill, H.R. 1980, offers a brighter future for the American farmer and the American gasoline consumer. Thirty-three Members of the House have already joined as cosponsors of this bill, the Grain Products Utilization Act. Although the legislation deals with promoting the use of gasohol, the principal provision of the bill provides for the Secretary of Agriculture to establish a loan guarantee program for the construction of ethanol-production plants.

Farmers and farm cooperative applicants would be given priority in receiving Government-backed guarantees for loans obtained through and approved by private lending institutions. The program would not furnish the loan funds necessary for the construction of the production plant, but would offer the private lending institution the assurance it would need to approve a loan for this type of project; 75 percent of the loan would be guaranteed with the amount of indebtedness guaranteed for any one loan not to exceed $5 million. Loan guarantees would not exceed $750 million at any one time.

The Secretary would also determine the feasibility of funding the loan guarantee program by the collection of a 1-cent-per-gallon assessment for each gallon of ethanol produced from a facility built under the guarantee program.

It is important to emphasize that no great outlay of public funds is called for under this program. The Government would guarantee the loans and not provide the money for them. I strongly believe that ethanol-production plants will be able to operate at a profit because the demand for gasohol will certainly continue to increase.

A loan guarantee program is a small price to pay to insure increased gasoline supplies that will benefit all Americans.

With the type of production plant program I envisioned with H.R. 1980, we would see employment in our rural areas increased by the actual construction and operation of the production plants. I believe tax bases would be expanded significantly. Quantities of grain would be near to the plant so there would be little energy expended in transporting the grain to this new market.

Gasohol would then be available for increased use in the locale of the plant and for shipment to distant gasoline markets.

Whatever may be the result of these hearings, I believe that the members of these subcommittees, the Congress and the American public will have a greater awareness of a new way to look at American agriculture.

Most individuals only look to American agriculture as a source of food and fiber for consumers and industries throughout our Nation. We now realize that American agriculture is also a source—a renewable and domestic source—of energy supplies.

When we think of government involvement with energy, the Department of Energy comes to mind. The presence of a Deputy Secretary of the Department of Agriculture at these hearings is significant as agriculture—the Department and the science—are

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being asked to play a more important part in our energy supply situation.

Our energy does not always have to come from under the surface of the ground or from some foreign source. With agriculture, it is right on the surface—every year and the supply and price are not controlled by exorbitant exploration costs or the whim of foreign leaders. Also, the money paid for this new source of energy will go into the pockets of Americans who need additional markets for their product.

We need to rethink our attitude toward American agriculture. These hearings are an important step in this direction. I urge my colleagues to keep this idea in mind. Agriculture can be more than the source of the food we eat or the clothes we wear—the science of American agriculture can be thought of as part of the overall energy production system of our Nation and the use of its products should be promoted as a source of alternative energy within the total energy production system.

Agriculture can be an accessible, dependable, and comparatively, I believe, inexpensive source of energy in the future. Legislation designed to promote this idea into reality will be a boon to this Nation.

I thank the subcommittees members for their time and assure them of my continued support of their efforts regarding alcohol-based fuels.

Thank you.

Mr. FITHIAN [acting chairman]. Thank you, Mr. Hagedorn.

[The prepared statement of Mr. Hagedorn follows:]

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"FOR THE RECORD"

Congressman Tom Hagedorn (Second District-Minnesota)
Prepared statement regarding the use of alcohol-based fuels.

Mr. Chairman, there is a growing realization that alcohol-based fuels have the potential to make a significant contribution toward alleviating several major national problems.

Alcohol produced from some of the most abundant and renewable natural resources in this country, including grain and wood, has been proven to be a highly efficient motor fuel, by itself or in a gasoline blend of at least 10 percent alcohol and the rest gasoline.

Ethanol--alcohol produced from grains and their byproducts--offers, in addition, the prospect of important new markets for domestic agricultural surpluses, particularly in areas of the country, such as Minnesota, where such surpluses regularly appear. This new market could offer a substantial stabilizing element to local economies.

While the renewed interest that has been shown in gasohol lately is largely attributable to the increased cost of motor fuel and the decreased availibility of supplies of gasoline, alcohol fuels are no fad for they have been used in various parts of the world since early in the century.

They were a major component of the German military machine during the Second World War. In the United States, alcohol fuels were used to propel some of the earliest of Henry Ford's Model Ts. They have been used to power most racing vehicles and were sold commercially in the Midwest during the 1940s. In other nations, particularly Brazil and South Africa, alcohol fuels have been used increasingly in place of petroleum-based sources. Brazil, which derives alcohol mainly from the roots of local sugar crops, is expected to use it as an important substitute for part of its total gasoline supply by the early 1980s.

It is no secret that the periodic surges in interest in alcohol fuels are closely related to periods of high gasoline prices. That they have not taken hold yet is primarily due to the fact that production remains uneconomic during normal circumstances. However, with the weekly increases in gasoline prices because of decreased supplies,

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alcohol fuels are becoming commercially competitive with premium unleaded gasoline and more and more stations are offering gasohol as an alternative fuel. With gasohol placed in a more attractive position with each price increase, more emphasis must be placed on increasing its availability.

I have introduced H.R. 1980, The Grain Products Utilization Act to promote the development of gasohol and to attempt to eliminate the competitive gap between gasohol and more conventional motor fuels. It is designed to build upon initiatives that have already been taken by several States, individuals, government agencies and the Congress toward promoting the use of alcohol-based fuels.

First, the act would provide increased direction to both the Departments of Agriculture and Energy in researching gasohol technologies. In particular, the Department of Agriculture would be charged specifically with reviewing existing studies, and conducting new ones where necessary on:

The effects of ethanol development on farming practies, farming organization, prices of agricultural commodities, farm income and rural economy of the United States:

The effects of ethanol development on U.S. agricultural policies and programs, including trade relations between the United States and foreign countries;

The impact upon domestic consumer prices, and the extent to which world food resources would be depleted if agricultural production were diverted, in part, to gasohol;

The commercial and nutritive possibilities of the byproducts of ethanol, including distiller's dried grain solubles (a high-quality animal feed), protein supplements and carbon dioxide;

Alternative distribution and storage systems that might be used in marketing gasohol; and

Identifying agricultural products and their use in ethanol production as part of the overall energy production system of the

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United States and promoting agricultural resources as a source of alternative energy within the total energy production system of the United States.

The Department of Energy would be charged with reviewing existing studies, and conducting new ones where necessary on:

Alternative processes by which ethanol can be produced, including any undeveloped technologies required to refine or perfect these processes;

Safety considerations involved in the production and use of ethanol;

The economics and long-range competitive prospects for ethanol;

Means of reducing the amount of net energy expended in the production of ethanol;

The compatibility of ethanol with current automotive engines, and the feasibility of developing and utilizing alternative automotive materials and technologies;

Appropriate plant designs for various sizes of ethanol producing facilities;

The economic impact of ethanol development on existing industries, including existing energy industries; and

Identification of agricultural products and their use in ethanol production as part of the overall energy production system of the United States and promotion of agricultural resources as a source of alternative energy within the total energy production system of the United States.

The Grain Products Utilization Act would encourage the production of gasohol in two principal ways. A program of 75 percent guaranteed loans would be established to help in the financing of new ethanol-production plants by private lending institutions, with priority for guaranteed loan applications going to farmers and farm cooperative applicants. In addition, a five year amortization period would be permitted for gasohol producing facilities, encouraging capital investment in this enterprise that holds so much potential for growth.

Gasohol offers this country the prospect of a plentiful and

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renewable resource that can be used to ameliorate the energy shortage in this country, and add a further measure of stability to our rural economy, while providing us with a low-polluting, high octane motor fuel. With gasohol users using 10 percent less gasoline, there will be more of this valuable conventional energy source for others to use in the future.

Gasohol is not a miracle solution to the energy crisis and it will not allow the Congress to evade any of the difficult energy policy questions which it has been grappling with for the past several years. Gasohol does have the potential to make an unmistakable contribution to relieving some of our most immediately pressing energy problems.

The fact that the byproducts of the gasohol process will contribute positively to the world food situation, and the fact that food quality grains are not necessary for the gasohol process will insure that the impact of gasohol development upon food availability will not be substantial.

The technology of gasohol will become more sophisticated and the economics of gasohol will become more efficient if this country can simply manage to keep this enterprise on its feet for a short time with some up-front assistance. The potential rewards justify encouragement in this area.

The President has recently announced that his Administration will be assisting in the construction of new gasohol production plants. I am encouraged by the President's adoption and support of the principal goal of H.R. 1980--more production plants. The passage of a meaningful, comprehensive ethanol-production bill will insure that this product will be available to a waiting market that will need it even more in the future.

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Mr. FITHIAN [acting chairman]. Our next witness is the Honorable Virginia Smith, a Member of Congress from the State of Nebraska.

I understand, Mrs. Smith, that you would like to have Mrs. Betty Majors, the national president of WIFE, from Osceola, Nebr., accompany you.

STATEMENT OF HON. VIRGINIA SMITH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEBRASKA

Mrs. SMITH. As the chairman has said, my name is Virginia Smith. I am a Member of Congress from the Third District of Nebraska, the State that reinvented gasohol.

Members of the National Gasohol Commission from Nebraska will be testifying later today and in just a few moments you will be hearing from Mrs. Majors, who is the national president of WIFE.

I thank you and the members of these subcommittees for holding these hearings about H.R. 3905 and the development of alcohol from renewable agricultural materials. The hearings also provide an opportunity for the Congress and the Nation to update themselves about gasohol and alcohol fuels. The witness list is so impressive that I will read the transcript with deep interest and will urge all my colleagues in the House to consider it required reading in these times of energy crisis and shortage.

As a member of the House Committee on Appropriations, I am proud of my role as chief tormentor of administration energy officials at budget hearings about their singular indifference to research and development of alcohol derived from the renewable materials of agriculture. For years, they were deaf to my suggestions and questions. Then, on March 6, Secretary Schlesinger, testifying about budget requests for his Department of Energy, suddenly regained his hearing when I began my customary round of questions about gasohol and alcohol. Now, the President has embraced the idea.

And so I am proud of my role as catalyst in bringing appropriate Government officials together with developers and experts in the private sector to explore ways of improving the economic feasibility of agriculturally based alcohol as fuel for our incomparable agricultural and industrial production machine.

One example of this and of administration's new-found interest in alcohol fuels are ongoing talks and study between Department of Energy experts and an enterprise in my congressional district, known as the Scottsbluff-Gering Payroll Development Foundation. The project is the prospective conversion of five large sugar-beet processing factories to include production of alcohol made from a special variety of sugar beets.

The legislation before us today, H.R. 3905, is being brought forward at an extremely fortuitous moment in our national energy history. If wisely enacted and wisely administered, this bill could have significant results. Most importantly, consideration of this bill and its impact affords us the opportunity to take stock, to focus on where we go from here.

With this list of witnesses, I am thoroughly intimidated about offering anything technical or statistical for the subcommittee members' consideration. I will, instead, devote my time to empha-

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sizing that new legislation must adequately address the public policy questions so carefully that the Nation will never regret its investment in promoting alcohol fuels.

The greatest public policy question is the controversy over the energy efficiency of alcohol production—whether it takes more or less energy to produce a gallon of alcohol than can be derived from burning it as a fuel. Experts must reach a consensus on this before we can move ahead at full speed. I am hopeful that these 2 days of hearings will go a long way in that direction.

Another problem is that no national long-term, large-scale, carefully controlled gasohol usage test has ever been conducted or evaluated. I have introduced a bill, H.R. 3029, mandating such a test using part of the vast fleet of more than 400,000 federally owned motor vehicles. My bill calls for conversion of at least 10 percent of nonmilitary Government motor vehicles to the exclusive use of gasohol fuels in 3 years from enactment and for annual evaluations of the ongoing test. I would be happy to provide copies of this bill to the subcommittees for consideration for inclusion in H.R. 3905 if members deem it wise.

Another area of controversy is how much should production, marketing, and usage of alcohol fuels be subsidized. The present exemption of gasohol from Federal fuel taxes was forced upon a reluctant administration in the last Congress. This exemption expires in 1984. I have introduced a bill, H.R. 3030 to extend this exemption for 5 years. I agree with Mr. Fithian for I know that in the past officials of the Energy Department have appeared to be deaf when they appeared before the appropriations subcommittee, of which I am a member, and I have tried to get their suggestions and have asked them some questions about gasohol. So, you can understand my astonishment on March 6 when Secretary Schlesinger suggested that he thought we ought to extend the Federal tax exemption for gasohol. Now I read that the President now thinks we ought to extend this exemption permanently.

Finally, there is the problem of Government regulations already existing aimed at stamping out moonshine operations and controlling production of beverage alcohol chemically identical to that which we now propose to produce in enormous quantities purely for burning as fuel.

The Treasury Department already is studying ways to ease some of the regulations to facilitate the manufacture, blending, and marketing of alcohol as a fuel. Indeed, responding to a provision of the National Energy Bill of 1978, the Treasury Department recently issued a draft report and recommendations for simplifying present laws and regulation regarding the use of alcohol as fuel. The report, by a Gasohol Task Force of the Bureau of Alcohol, Tobacco, and Firearms, is undated and unnumbered, but I and my staff have found it useful and enlightening. I recommend the report to the subcommittees.

To summarize, let me just say that we are still the luckiest people on the face of the Earth. We have alternatives and options. Our task is basically a pleasant one—which courses of action are best for us to take to solve our energy problems? I commend the subcommittees for their willingness to plunge in when the adminis-

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tration has demonstrated its timidity with leadership that was too little and too late to prevent the current fuel crisis.

I thank the chairman, and now I would like to introduce Mrs. Betty Majors, the national president of WIFE, Women Involved in Farm Economics. Mrs. Majors happens to come from my district. I know of her dedication and her great effort in testifying before committees.

Let me tell you that this organization started in my district just 2 years ago with only 12 members. It now has more than 3,000 members in 18 States and 18 representatives from 7 States are here in this room this morning.

Mr. ROSE. Thank you very much, Congresswoman Smith. We appreciate your contribution on this matter as you have always contributed so much on many issues before the Congress.

Mrs. Majors, we are glad to hear from you. Please proceed.

STATEMENT OF BETTY MAJORS, NATIONAL PRESIDENT, WOMEN INVOLVED IN FARM ECONOMICS

Mrs. MAJORS. Thank you, Mr. Chairman and members of the committees.

On behalf of Women Involved in Farm Economics, WIFE, I wish to thank you for the opportunity to appear here today. I am Betty Majors, national president of WIFE, and also the wife of a Nebraska grain farmer.

I would like to tell you something of the WIFE organization. WIFE is an agricultural association of women organized in 1976 for the sole purpose of developing and promoting agriculture in the United States. It is a grassroots organization which is positive in pursuing its objectives and purposes, and is composed of women who are involved or interested in agriculture. We are women who are wives, mothers, grandmothers, and partners in agriculture with our husbands.

I will tell you that of the 18 ladies that are here today, we have each left our homes, our farms, and our ranches, to come here at our own expense to testify.

WIFE has considered gasohol one of its priorities and its members have worked diligently toward its promotion. At the National WIFE Convention in Billings, Mont. last November the following resolution was passed:

> Be it resolved that National WIFE supports the production and use of gasohol and that WIFE accepts responsibility within its chapters for educating both the private individual and public official on gasohol's use and potentials as a fuel extender for this nation and as an additional market for our farm commodities.

The National Steering Committee of WIFE in listing its priorities in January for 1979 priorities listed gasohol as the No. 1 priority. So it is with this in mind that I am here today.

WIFE chapters have financed gasohol seminars, held informational meetings and have given of their time, effort, and money in the support of gasohol. We in WIFE know that gasohol does work.

It was in 1977 that Montana State WIFE promoted a "gasohol convoy" to Washington, D.C. to emphasize the use of gasohol as well as to inform others of its use. They drove from Montana to Washington their vehicles fueled by gasohol, keeping records of their miles per gallon. A report of this WIFE "gasohol convoy" has

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been submitted to this committee. The Montana WIFE group proved that gasohol was indeed a most viable fuel and was the forerunner of many road tests.

Had it not been for the acute shortage today, we would have driven on gasohol. However, we do have one member from the State of South Carolina who did drive her car here and she is here with us today. She came on gasohol.

How is it possible that we, the greatest of all nations, can be brought to our knees by an energy crisis such as exists today? We, who have among us those of the highest intellect, knowledge, and expertise. Have the leaders of this Nation been unaware that our energy needs of the future could not be met, or has the realization just become apparent.

The United States entered the 1973 embargo with a 54-day supply of oil and in February 1979 its inventory totaled about a 70-day supply. The oil embargo was but a warning to America of the actual seriousness of the situation concerning the Nation's energy. We are fast running out of fuels and we must have alternatives now.

Why have we in this great Nation become reactors rather than a nation who foresees future needs and acts accordingly?

Why does it take a near disaster on such issues as energy before alternatives are sought? Gasohol and alcohol fuels are not new.

To hold a hearing on alcohol fuels could not have come at a more appropriate time in view of the critical energy crisis that exists in this Nation today. To see so many food and fiber producers as well as nonproducers enthusiastic in regard to alcohol fuels is indeed heartening. My home is in Nebraska where gasohol, while not necessarily a household word, is most assuredly considered not a fuel of the future but a fuel now in use.

Even if we can muddle through the critical shortage of fuel and our distribution problems, this does not solve the energy needs. Agriculture uses about 3 percent of the total energy used in the United States. The farmers and ranchers are currently using over 4.4 million tractors, 3 million trucks, and 500,000 combines. More than 35 million acres are being irrigated using pump systems. Over 20 million tons of fertilizer and 400,000 tons of pesticides are being used annually by the Nation's farmers.

Everyone of the above require energy of one form or another. Either as a primary ingredient in the manufacturing or as a fuel for operation. So, if enough diesel is available to prepare the ground for planting, then comes the planting, the spraying, the irrigation, and then harvest. All need additional fuel. We do not have alternatives left for fuel now.

The energy needs for agriculture have always been met, but we were not then dependent upon other nations for our fuel and our energy needs.

During the war years agriculture received special consideration in meeting their energy needs and requirements. Fuel and energy needs must be met now if food and fiber needs are to be met.

Agriculture energy has become more expensive and less plentiful. Now we have no choice but to look at renewable energy sources. Gasohol, or alcohol fuels are the fuel not of the future but of now. We have a renewable energy source in the very crops and

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from the residue of those crops that we in agriculture grow. Gasohol has been tested, feasibility studies have been made; and road tests have proven that gasohol is a viable fuel.

Energy needs in agriculture must be met if the food production is to continue at its present level. The acute shortage of diesel in some areas of this Nation point to the fact that: (1) There is a real problem; (2) distribution of fuel is a problem; (3) fuel is available to those who are willing to pay the price. Anyone of these options are reason enough for our Nation to develop a sound and complete energy system.

Rural America must have energy if crops are to be grown and food and fiber produced. Rural America needs energy for transportation as well as the production of food and fiber. An automobile or a pickup is essential since that is the mode of transportation. There is little choice. In Polk County, where I reside, there is no bus, no train, and no plane for transportation. The closest plane would be 75 to 90 miles away. Many counties in this Nation are in the same situation. In fact, one of our WIFE members drove for 300 miles to catch the plane.

I find it difficult to believe that the Energy Department, the administration, and the Department of Agriculture have been so hesitant to even mention alcohol fuel. It does little to assure the American people that a solution to the energy crisis is being sought or a real commitment made.

Millions of gallons of gasohol have been sold across this Nation. We have used gasohol in our pickup and car since it first became available in our community. I think a Nebraska winter is a good test for gasohol since it is often 40 below zero with the wind-chill index factor. Our vehicles started, rode, and drove without encountering any problems.

As of May 10, gasohol was selling for 83 cents, regular 80 cents, and premium 84 cents. I consider a renewable fuel such as gasohol to be a priority. It works and it has been proven. It is the renewable energy source whose time is now.

Once again, I reiterate the position of WIFE in the use of gasohol for fuel and as an additional market for farm commodities.

Mr. ROSE. Thank you very much. We want to thank you both.

Are there any comments from members of the committees? Mr. Fithian.

Mr. FITHIAN. I have one quick question.

Mrs. Majors, has the WIFE organization put any resources into studying an analysis of the octane-boosting aspects of gasohol?

Mrs. MAJORS. We have not.

Mr. FITHIAN. As you know, there is a great deal of consternation, at least in our district and I think in a lot of other districts, about why unleaded gasoline costs more. There is a scientific explanation for that which is difficult to get across, but basically it has to do with the high compression nature of the contemporary automobile engines and the environmental requirements of not using tetraethyl lead as the octane booster.

Maybe the organization is good at getting the word around. Maybe you might have someone look into that. We are looking into it now. We are looking into a number of areas. It does seem to hold a real economic advantage in terms of gasohol being used as an

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octane booster. It does have a 3 or a 4 point octane advantage over other fuels. Inasmuch as the new automobiles are not using leaded gasoline, then you have to find the octane booster somewhere. There is a great argument right now. I believe it is valid to say that gasohol economics will change rather dramatically. The Deputy Secretary referred to that briefly this morning when he said something about making it available at the refineries.

That might be one thing, though, that would help boost the economics. I just throw that out for your suggestions.

I want to thank you for your testimony. We are glad to meet you. Nebraska is my old stomping grounds. I was glad to meet the whole caravan in Indianapolis when they stayed overnight during that drive.

Mr. ROSE. Mr. Glickman.

Mr. GLICKMAN. I would also like to welcome Mrs. Majors. I am your neighbor to the south.

You asked the question about why our Government cannot seem to develop alternative energy resources. I think the uniqueness of gasohol was the fact that it did not develop from the top down. It developed from the bottom up. It was a grassroots fuel that did not require a major oil company or the U.S. Government to start the process going.

Now all we hope for is this: When those two entities, the major oil companies and the U.S. Government get involved we hope they will not destroy it. As long as you keep your input in the process, I think it has a reasonable modicum of success.

Mrs. MAJORS. Thank you.

Mr. ROSE. Thank you.

Are there any other comments?

If not, we thank you both for your testimony.

I have a note here from Mr. Donald Lutz who is our next witness. Mr. Lutz is a farmer from Mohrsville, Pa. and ASCS committeeman.

Please proceed, Mr. Lutz.

STATEMENT OF DONALD E. LUTZ, FARMER, MOHRSVILLE, PA.

Mr. LUTZ. Thank you.

Mr. Chairman and members of the subcommittees, I wish to thank you for allowing me to testify here today.

I am Donald E. Lutz of Mohrsville, Pa. I am a Pennsylvania Dutch farmer and also work as a dairy herd improvement supervisor. I am also on the Berks County ASC Committee.

What can we do about the chaos of our times? We can and must do all we can to achieve an orderly transition from our traditional sources of energy to alternate sources of energy. All alternate sources of energy go hand-in-hand and all will be needed and must be developed.

During the past few winters we have had cool homes. Next winter we are going to have cold homes. Unless we have a crash program now to promote alternate sources of energy.

The ASCS is a natural to administer such a program. ASCS with its committee system is ready, willing, and able to take on this vital program.

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In Hamburg, Pa., a man is building and marketing wind generators that have the customers selling electricity to the electric companies.

In England a man produced the equivalent of 10 gallons of gasoline from 100 pounds of animal waste.

A busload of people came to Hamburg, Pa., from the State of Delaware running on methane gas taken from a home septic tank.

In Bradford County, Pa., a man is heating an apartment house with corn alcohol that he makes. The aerobic process does not diminish the feed value of the grain used and can be fed wet or dry. The sentiment among the people in Pennsylvania is very strong to devote all set-aside acres to the production of grain for fuel alcohol.

In the East we have no large operations like the Western feedlots. We would do well to keep the production of alternate forms of energy on the small farms.

In Athens, Ga., there is an alcohol co-op. Farmers can take their grain in and exchange it for denaturized alcohol and distillers grain. Ex-moonshiners are managing the fuel alcohol co-op and ex-revenuers are inspecting the operation. Race cars run well on alcohol. Many of these alternate sources of fuel can be burned in diesel motors, along with diesel fuel, if injected on the air intake.

I have visited the methane projects at Penn State and Cornell Universities. They are doing advanced and coordinated research in this field, but are a little bit short on innovations. In some cases the do-it-yourselfers are ahead of organized research. The success of the new American diesel car is the supreme achievement of the American do-it-yourselfer.

On March 7, 1977, I recommended to the Senate Agriculture Committee that the Western feedlots be used to power the fuel price idled irrigation pumps of the West, especially in the Pecos Valley. My recommendation was a little bit late as the solar pump for ditch irrigation came into its own about that time.

But the Western and Southern feedlots have been used on a large scale very successfully to produce gas for urban use. Large scale methane generators are great for large feedlots and for urban waste disposal systems. In the Northeast we have no large feedlots. We should encourage through ASCS grants and loans the installation of gas generators on small family farms. Suburban people are anxious to buy methane gas from nearby farms. This could well be a new farm product. ASCS has been subsidizing animal waste storage facilities.

When I was elected to the Berks County ASC Committee, I raised the question of why not go one practical step further and subsidize, through grants or loans, methane generators on these animal waste storage facilities? Senator Gaylord Nelson has introduced legislation along this line, only to have it always die in committee.

What are the obtacles to alternate sources of energy? Public apathy—"Pop didn't do it this way, so I guess I won't."

The Ayatollah Khomeini and OPEC are among the opposition. Companies selling fossil fuels and energy made from fossil fuels warn that alternate sources of energy might create unemployment. Not so, the age of petroleum is coming to a close. We have lots of

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coal but the coal producers never heard of pricing themselves out of business. Alternate sources of energy will make employment.

Price control of our energy sources has not controlled the price of energy. Decontrol will only create more problems. Price rationing will put energy out of reach of those who need it most. Conversion to alternate sources of free energy is the best means of price control of fossil fuels.

By using our cellulose waste and sewage for energy, we can eliminate many of the problems caused by open dumps, unsanitary landfills and ocean dumping.

I have always felt that we can successfully overcome the challenge of the fuel shortage. American ingenuity will have its finest hour. The do-it-yourselfer will reach unheard of achievements.

Thank you, Mr. Chairman.

[An attachment to Mr. Lutz' statement is held in the subcommittee file.]

Mr. ROSE. Mr. Lutz, we thank you very much for your testimony.

Our next witness is Mr. Larry Schrawder.

STATEMENT OF LARRY SCHRAWDER, BERKS COUNTY, PA., CHAPTER OF THE FUTURE FARMERS OF AMERICA

Mr. SCHRAWDER. Thank you.

My name is Larry Schrawder and I am here to represent the Berks County Chapter of the Future Farmers of America.

I will summarize my statement.

Mr. ROSE. That will be fine. It will help us with time.

Without objection, your entire statement will be inserted in the record.

Mr. SCHRAWDER. All the basic statistics on gasohol have been brought out this morning. However, we as future farmers feel basically that in order for farming to be profitable in the future, we have to be able to develop alternate sources of energy so we would have means to work with. We also have to work to develop alternate other markets for our commodities.

I think what we have in this gasohol and alcohol production is a chance to use the excess grains that have been produced over the past few years for constructive use instead of holding our prices lower.

By producing alcohol American farmers producing alcohol would extend our limited petroleum supplies and open new markets for farm commodities which would increase prices and end the need for Government subsidizing of farmers.

It would also provide consumers with a high quality automotive fuel, which I think is essential now that we are so limited in petroleum.

As far as the committee is concerned, I feel what would really help is just the legalization of farmer-produced alcohol. Farmers have proved in the past that they can produce alcohol by their moonshine, et cetera, so I think they can also produce alcohol as a fuel and make it profitable.

I would also like to see set-aside acres used to produce alcohol. This land that farmers have to set aside to participate in other programs is expensive as far as paying rentals or buying it. I think

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instead of paying taxpayers' money to support setting it aside, we could be using the grain for something like this.

Those are my comments, and I thank you for allowing me to testify here.

Mr. ROSE. I want to thank both of you for coming here from Pennsylvania to give us this testimony. You helped to balance out our testimony. We thank you for your contribution.

[The prepared statement of Mr. Schrawder follows:]

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Statement of Larry Schrawder, Berks County, Pa., Future Farmers of America

I am here to represent the Berks County Chapter of the Future Farmers of America. Since most of us have chosen agriculture as our occupation we are naturally concerned about the future of agriculture in the United States. Two of our major concerns have been energy and whether agriculture will be profitable in the future.

We are now seeing long lines at California gas pumps even with the odd-even system of rationing that has recently been imposed in some counties. This has been caused by only a twenty to fifty percent cutback in fuel supplies. It has been estimated however, that the United States produces enough grain and sugar each year to produce forty billion gallons of alcohol without disrupting our food and feed supplies. This amount is sufficient to convert approximately forty percent of our annual fuel consumption to alcohol.

Alcohol has many advantages when used as an automotive fuel. It is totally renewable, relatively non-polluting, and fairly economical to manufacture. So, it boils down to this. The internal combustion engine does not have to be run on gasoline. In fact, prior to World War II, car manufacturers offered buyers a choice of carburetors which allowed the consumer to burn fuels other than gasoline, if he or she desired. In fact, it was not at all uncommon to see a farmer power his John Deere tractor with kersosene, fuel oil, gasoline, or even alcohol made from his own spoiled crops.

During this period, technology and the necessity of war made it possible for gasoline to be produced in greater volume and cheaper than other forms of fuel. Slowly the American public was converted to gasoline consumers and they soon forgot that alternate fuels existed.

Forgot, that is until the harsh reality of the 1974 fuel shortage again proved the fact that we were (and still are) pitifully dependent on foreign petroleum sources. And at that point, alcohol fuel again enters the scheme of things.

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Dwight Miller, a scientist at the USDA Northern Regional Laboratory at Peoria, Illinois stated that "you produce more energy in byproducts and residue than in the corn you harvest". Not all of that residue is needed to go back to the land. Some could be converted to fuel. Being made from grain and residue makes ethanol our only totally renewable fuel. Alcohol also has an octane rating of 110 - 111. In comparison unleaded fuel is supposed to have an octane rating of ninety-one but generally runs less. Refineries are also wasting alot of petroleum trying to obtain this rating without tetraethyl lead.

Alcohol is also much lower in pollution - cutting carbon monoxide emissions by 95%, hydrocarbons by 90% and reducing nitrous oxides by 90%. Ethanol can be burned in any internal combustion engine without modification in a mixture with gasoline of up to 15%. Currently in the midwest a product called gasohol has recently come on the market. Gasohol is a mixture of regular gasoline and 10% ethyl alcohol. The result is a higher octane, cleaner burning automotive fuel. Among other things alcohol gives motorists a five to twenty-five percent increase in gas milage. It is for these reasons that many motorists are more than happy to pay the two cents over premium for the alcohol-gasoline mixture.

At this point your question to me might be: sounds good but what does alcohol have to do with the farmer. My answer to you is simple. Since alcohol is made from agricultural products, it could open an entirely new market which would increase demand and consequently raise the price of farm commodities.

The magazine Fusion takes the view that "an increase in the highly inefficient ethanol would force the population to accept a massive decrease in food supply for the sake of a token increase in fuel supply". What this magazine fails to mention is that during the production of ethanol the by-product distillers grains are worth more per pound after fermentation than the whole grain was before. Therefore we would not be using up the grain, we would merely be converting

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it to a high protein cattle feed. As for the "token fuel supply", it is estimated that the United States produces enough grain and sugar each year to produce about four billion gallons of grain alcohol without upsetting the food and feed market. This volume is adequate to convert approximately forty percent of our annual automotive fuel consumption to alcohol. Is it Practical? Brazil started a program two years ago to replace their gasoline with alcohol. Now after a year and a half, they are currently producing eight percent of their automotive fuel as alcohol. By the end of the year, they predict that they will be producing twenty percent of their annual fuel consumption.

Statistics show that when ethanol is distilled from corn it yields an average of 2.5 gallons per bushel. However some of the old time farmers have assured me that they were getting up to 3.5 gallons per bushel in their moonshine stills. These figures have not been officially documented, however, for obvious reasons.

If corn costs $2,50 per bushel and yields a conservative figure of 2.5 gallons of grain alcohol, the alcohol would cost $1.00 per gallon. However, the part that is frequently overlooked is that after the alcohol has been distilled the distillers grains left over have more feed value per pound than the whole grain did before distilation. Thus instead of using up the grain we would merely be converting it to a high energy cattle feed.

Alcohol production by American farmers could serve many purposes. Not only would it extend our limited petroleum supplies but would also open new markets for farm commodities. This would increase prices, end government subsidizing of farmers as well as provide consumers with a high quality automotive fuel.

How can you as a committee help? Simply by legalizing farmer produced alcohol and making it legal to own and operate alcohol stills. Once this is legalized the industrious American farmer can develop alcohol production into a practical, profitable industry. Thankyou.

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Mr. ROSE. We will now call Mr. Pincas Jawetz.

It would be helpful, Mr. Jawetz, if you could give us the meat of your prepared comments. We could then get some discussion going with you about this technology.

Will you please proceed.

STATEMENT OF PINCAS JAWETZ, INDEPENDENT CONSULTANT ON ENERGY POLICY, NEW YORK, N.Y.

Mr. JAWETZ. My presentation is a very meaty presentation. It would be very hard to summarize it without losing the meat, so let me do as much as I can. I would appreciate very much getting questions from members of the committees.

Mr. ROSE. You understand that we are very familiar with the need for developing alternative fuels and the need for reexamining our farm policy to find ways that we can motivate the Department of Agriculture. What new information can you bring us about this process or about this legislation that you think would be helpful to us as policymakers?

Mr. JAWETZ. My presentation is not in order to give justification to the need for this legislation. I think the justification is there. There is no need to debate that.

My presentation here involves two parts. One part brings an example as to what could have happened if last year we would have had a reasonable national policy that would have linked farm policy and energy policy.

Building on this example, I move forward to dispel some of the improper presentations that were made by oil interests and by other interests that are opposed to introducing an alcohol fuels program.

I think that in order to have a coherent presentation I really have to go through my prepared material.

I am just back from a meeting in Vienna where 42 countries were represented. This meeting was organized by the United Nations Industrial Development Organization. Many of those countries were represented by officials of departments of energy and by members of parliaments. This country was represented by four people. Three were invited to talk; Professor Scheller, who is here in this room, myself, and the man from Union Carbide. There was no representation from the USDA or the Department of Energy.

[The prepared statement of Mr. Jawetz follows:]

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testimony by

PINCAS JAWETZ

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at Joint Public Hearings on

THE NATIONAL ALCOHOL FUEL AND FARM COMMODITY PRODUCTION ACT OF 1979

to be held by the Subcommittees on
Department Investigations,
Oversight and Research,
Conservation and Credit
and Livestock and Gains.

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON AGRICULTURE

Washington D.C. May 15, 1979.

Mr. Chairman and members of the committee:

As background for my presentation I would like to include in the record an article that was published in Chemical and Engineering News, July 31, 1978: "Gasohol: Energy Mountain or Molehill?". Also, considering time constraints at the testimony, and wanting to leave enough time for questioning, I propose to supplement my oral-statement with further written material that I submit for the record.

(The article referred to by Mr. Jawetz is held in the subcommittee file.)

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I am an independent consultant on energy policy. I was involved for years in studies in the production of liquid fuels from oil shales and coal and I have been involved in developing plans for U.S. National Energy Policy while a consultant to the Hudson Institute. Starting the summer of 1977 I got interested in the potential of fermentation alcohols for a U.S. energy policy.

I do not believe that it is possible to compartmentalize policy. A National Policy should indeed incorporate and relate such areas as farm policy, energy policy, monetary policy, foreign policy, employment planning etc. For one and a half years by now I am trying to get the Departments of Energy and Agriculture to consider each others policies in their own policy making mechanisms . While still connected to the Hudson Institute I have submitted proposals to D.O.E. for studies on economic impacts of an alcohol fuels policy, but I was laughed at - this is impractical I was told.

This year, March 26-30, 1979 I presented a paper, which I called "The Common Sense Approach in Developing Fuel Alcohols", before the "Workshop on Fermentation Alcohol for Use as Fuel and Chemical Feedstocks in Developing Countries". The workshop was called by the United Nations Industrial Development Organization, at its headquarters in Vienna Austria. Participants including government officials, scientists, economical planners, and representatives from industry came from about 40 nations. The speakers were from over 30 nations. From the U.S. there were only four participants: Professor Scheller, myself, and two representatives of Union Carbide. Neither D.O.E. not U.S.D.A. were represented. As it was quite clear at the meeting, many nations are extremely serious about decreasing their dependence on imported crude.

Reverting to the subject of our hearings, the bill introduced by Congressman Berkley Bedell, I strongly back the general approach of this bill, though, as it will become clearer during

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my testimony, I believe that changes can be devised in the mechanisms of implementation of the bill.

In order to make myself better understood, and in order to make a contribution to the subject, I would like to point out what could have happened had farm policy and energy policy been coordinated at the time of the 1978-1979 agricultural season.

Our existing farm policy recognizes two routes leading to a subsidized decrease of supply of agricultural commodities:

(1) The basic set-aside of croplands where farmers have to let fallow 10% of their usual acreage in feed grains (corn, barley and grain sorghum) or 20% of their usual wheat acreage. The farmers benefit then from a guaranteed minimum target price, from a farmer-owned grain-reserve system, and from loans.

(2) Farmers that have agreed to the basic set aside program can then choose to increase non-producing lands beyond the minimum requirements and receive direct payments for the additional acreage. The subsidy limits are an additional 20% for wheat land, 10% for feed grains and 10% for cotton land. The farmers receive then 50 cents per bushel of wheat produced on the remaining 60% of their land, 20 cents per bushel of corn produced on the remaining 80% of their corn land or 12 cents per bushel of sorghum or barley produced on 80% land, or 5 cents per lb. of cotton produced on the 90% of their cotton land.

U.S.D.A. has certified that in 1978 13.4 million acres of acknowledged cropland have been left fallow under the basic set-aside program, and an additional 5.3 million acres were left fallow under the diversion program for direct payment.

The basic set-aside program included - in million acres: wheat 8.4, barley 0.6, corn 3.3 and grain sorghum 1.1.

The diversion program acreage included - in million acres: wheat 1.4, barley 0.2, corn 2.8, grain sorgum 0.4, and cotton 0.5.

To calculate the funds tied up in subsidizing the basic set-aside program is not easy (I was told, the yet unpublished Office

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of Technology Assessment Report estimates the agricultural subsidies at $1.6 billion/year). For the diversion program we have had in 1978: $406.78 million in corn programs, $64.26 million in wheat programs, $21.58 million in sorghum programs, $8.45 million in barley programs, and $47.25 million in cotton programs. The total payment for diversion programs was thus $548.32 million.

Potential for Production of Ethanol: Let us assume for a moment that we could have planted corn on all 5.3 million acres under the diversion program. At 100 bushels per acre (the 1978 national average was 100.8 bushels per acre) and 2.6 gallons of anhydrous ethanol 200 proof, per bushel of corn, we could have produced over 32 million barrels of alcohol. Over 115 million barrels could have been produced if the basic set-aside acreage would have been included and when pulling into production additional lands, the potential for production of alcohol from agricultural commodities grown specifically for this purpose could reach up to 200 million barrels.

The availability of subsidy funds: Taking the yields used for the diversion payments calculations (90.8 bushels of corn/acre, 30.6 bushels of wheat/acre, etc.) one gets 234 gallons of ethanol per acre of corn. If one had planted corn and used the payment for non production in order to create a subsidy for the distiller one could have made available at least $0.62 to subsidize a gallon of ethanol. Calculating the subsidy as a weighted average of the different agricultural crops as the other crops receive less subsidy than corn under the diversion program, the average subsidy drops to $0.44/gallon of ethanol. let us note here that all these calculations are only for the diversion payments while additional subsidies remained untouched under the basic set-aside program.

Ethanol as an octane boosting additive to gasoline: We suggest here to regard ethanol as an octane boosting additive to gasoline rather than as a new source of fuel. The addition of 10% ethanol to 90% low octane unleaded gasoline, the composition commonly

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called "gasohol", increases, according to Professor Scheller, the average octane value (average of research and motor values) of the mixture by 3 points. Mr. Benjamin R. Jackson, Acting Deputy Assistant Administrator, U.S. Environmental Protection Agency has found the octane value increase to be equal to 2 average octane numbers but according to personal information I have from Brazil the number is higher than 2. Even the lower value will suffice to increase the octane quality of regular unleaded gasoline from its present 87 octane numbers level, to a more acceptable level to the fleet of newer cars. The higher octane value of gasohol, as compared to unleaded gasoline, entitles the additive ethanol to a premium value equal to 30 cents/gallon of ethanol. Also, disallowing the use of lead or manganese compounds for octane boosting purpose the Environmental Protection Agency has pushed the oil companies to increase their reforming capacity. In the reforming processes benzene and toluenes are manufactures from straight chain hydrocarbons in an energy intensive process. By using ethanol as an octane booster in gasohol one does therefore not replace only 10% gasoline by 10% ethanol, but rather closer to 16% petroleum is being replaced by 10% ethanol according to testimony originating with the American Petroleun Institute at the time they campaigned for a deregulation of the price of gasoline.

The Economics of Ethanol: According to Mr. Lipinsky, from Battelle Columbus Laboratories, the net cost of producing a gallon of ethanol is $1.17. This cost includes the cost of corn at $2.50/bushel conversion costs, capital costs, and by product credits. Others have made evaluations that range between $1.20 - $1.30 a gallon. Assuming here a $1.20 value and crediting 30 cents for the octane boosting value of ethanol, we are left with 90 cents - the net cost per gallon of ethanol.

Introducing now the element of policy planning via a linkage of farm policy and energy policy, one could deduct from the 90 cents, the 62 cents we found as an available subsidy if one would have phased out the diversion program for corn-lands alone. One

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could have produced 32 million barrels of ethanol that costs 28 cents/gallon. This without any elimination of Federal Fuel Excise Taxes and without the elimination of any State taxes. If all the diversion lands were put into production, considering the lower available average subsidy levels, the cost of a gallon of alcohol would have been 46 cents. All these calculations assume the cost of a bushel of corn at $2.50/bushel while still allowing to the farmer all the benefits of the basic set-aside program.

If the distiller were to pay only $2.20/bushel of corn, without being afraid of sounding ridiculous, I suggest here that the true cost of a gallon of ethanol, within the frame of existing farm subsidy payments, would have been 17.5 cents/gallon if produced on land diverted from corn production, or 35.5 cents/gallon if produced on land from the total diversion program.

If one were to produce ethanol also on all of the available land from the basic set-aside programs, a detailed study of the farm subsidy system would reveal that the existing subsidies, and the 40 cents/gallon of alcohol made available via the elimination of the Federal Excise tax, will suffice to guarantee the viability of a National-fuel-fermentation-alcohols program. To be noted here is the extremely intricate nature of the farm subsidy system and the less than candid attitude taken to the subject by the officials of the U.S. Department of Agriculture when discussing the possibility of using the surplus lands for a productive purpose. This lack of candor was quite noticeable at recent hearings before the Subcommittee on Energy Development and Applications Committee on Science and Technology. At the hearings U.S.D.A. proposed that as the price of commodities goes up the farm subsidies vanish and it was only because of a specific question that the existence of the diversion program was mentioned.

Land Availability, Commodity Prices and other miscellaneous arguments:

(1) It is safe to assume that the 1979 set-aside and diversion

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acreage will not be much different from the 1978 acreage.

(2) The existence of unproductive lands does nothing for food supplies. The argument that the land may be needed as a land reserve has to be viewed rather in the light that only when ... planted and harvested the land reserve becomes a food reserve. It is possible to return the crop to the use of food and a gasohol program will allow this practicality.

(3) If one constructs distilleries now and finds that later the feedstock is changed from starches to cellulosic materials, the distillery can continue to be used provided that a system is established for the brakedown of the cellulose.

(4) The manufacture of alcohol is a product oriented activity. At present, and foreseable for some time the backbone of the program remains a subsidy system. As described above the distiller receives his subsidy when he proves that he has produced X gallons of ethanol for which he has to buy e.g. Y/2.6 bushels of corn. The distiller has thus the responsibility to buy up the corn from the farmer and this corn will not show up on the food market without getting the Administration involved in the trade of corn as buyer and seller.

(5) The energy balance question has been unbelievably misrepresented. Starting out with the oil companies' objections to a gasahol program, and following through with D.O.E. studies and U.S.D.A. publications, one finds mainly the argument that two units of energy inputs measured in BTUs are needed in order to produce one BTU of ethanol.

This argument misses out on several counts:

(a) The analysis was done with installations in mind that were built before one did any energy accounting.

(b) The use of BTU measurements is not justified when one talks of changes of a chemical energy to a mechanical energy. One has to introduce utility factors to correct for the misuse of the

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BTU unit. Otherwise one does not allow for credits for the fact that ethanol is an octane booster, and gasohol allows for actual gains in motor efficiency as measured in miles/gallon. All this despite the undisputed fact that ethanol does indeed have only about 2/3 the value of BTUs of gasoline.

(c) The oil industry and D.O.E. and U.S.D.A. have not attempted to analyze the end-use of the ethanol and a total energy balance should include both - the production of the ethanol and the replacement value of ethanol at the end-use stage. Studies I have performed in order to establish a factor for this second effect resulted in a value equal to 3.75.

To summarize this presentation:

(1) It is amazing that we continue to subsidize the non production of agricultural commodities while these could be used as a base for needed fuel additives.

(2) It is possible to design a policy that will allow the production of ethanol for fuel purposes without creating new subsidies, but rather by redesigning the way how existing funds are being spent.

(3) The energy balance question has to be viewed in the light of end-use effects of the product and not only in the light of the manufacturing of the alcohol.

(4) A policy has to be stated clearly and implemented so that the risks in making capital investments in the construction of alcohol distilleries are minimized. The National Alcohol Fuel and Farm Commodity Production Act of 1979 does provide needed assurance to industry.

Thank you for having given me the opportunity to express my views on a subject that is close to my heart and which, without exageration, does sometimes indeed cause me an uneasy feeling about the future of this country.

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ABSTRACT
5 February 1979
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United Nations Industrial Development Organization

Workshop on Fermentation Alcohol for Use as Fuel and Chemical Feedstock in Developing Countries

Vienna, Austria, 26 - 30 March 1979

ABSTRACT

THE COMMON SENSE APPROACH IN DEVELOPING FUEL ALCOHOLS*

by

Pincas Jawetz**

Fermentation alcohols can be obtained from a very divers series of primary materials. Some of the feedstocks are biomass and waste materials, others can be grown specifically for the purpose of manufacturing alcohol fuels to substitute for imported fossil fuels. Questions arise whether the cultivation of energy crops makes sense in terms of energy yields and overall economics. Specific and particular conditions to a given area allow for a variety of primary materials, and for differing economics. The subject of alcohol fuels becomes diversified and is dependent on a specific climatic and economic environment. Nevertheless, one can draw certain generalities when analizing the practicality of developing fuel alcohols.

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Our presentation purports at first to clear prevalent misunderstandings when calculating energy balances for the production of alcohol fuels. The need will be shown to develop utility factors to correct for the prevalent misuse of BTU units in energy output / energy input ratios. These factors are calculated when comparing in terms of miles per gallon the use of ethanol-gasoline mixtures and pure gasoline. The introduction of utility factors allows us to show that a positive energy balance results from the use of ethanol-gasoline mixtures Furthermore, when studying different ways of producing an octane-booster for low-octane regular un-leaded gasoline, one finds that the use of ethanol for that purpose causes large savings in crude that would otherwise be needed when increasing the streams of aromatic or branched aliphatic hydrocarbons from petroleum and natural gas as starting materials.

Having considered the energy balances we shall turn our attention to ways to link farm policy and energy policy. Special attention will be given here to United States farm policies that subsidize so called set-aside and land diversion programs where a percentage of the land is left idle each year and the farmer is paid to decrease his output in order to support the price of the commodity. It will be shown that the present subsidies for non -production on those lands could effectively provide the funds necessary to establish a fuel alcohol industry in the United States and to subsidize the distilleries in order to make alcohol costs competitive with gasoline.

The present U.S. laws prescribe the elimination of the federal excise tax on gasoline (four cents per gallon) for any fuel that contains at least 10% alcohol which is made from any primary material other than crude, natural gas, or coal. This law will allow the importation of alcohol made from vegetation sources overseas, thus allowing for the development of alcohol industries in the Caribbeans and in Central America.

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Mr. ROSE. I am glad that you did not let me talk you out of presenting your entire testimony. That was an excellent presentation.

Please remain at the table, Mr. Jawetz. We will have time for some questions if you will remain at the witness table.

Mr. Neil Sampson is our next witness. He is the executive vice president, National Association of Conservation Districts. We will hear from him now.

Mr. Sampson, will you please proceed.

STATEMENT OF NEIL SAMPSON, EXECUTIVE VICE PRESIDENT, NATIONAL ASSOCIATION OF CONSERVATION DISTRICTS

Mr. SAMPSON. Thank you, Mr. Chairman.

I will try to be brief. I have a prepared statement for the record.

Mr. ROSE. That will be fine. Without objection, your entire prepared statement will be placed in the record.

Mr. SAMPSON. We are the National Association of Conservation Districts representing those people out in the country. We have twin concerns in this matter. The American farmer, of course, is in deep economic trouble and he needs markets. We realize that.

At the same time, America's farmland resource is, for the first time in the history of our Nation, reaching the point where we need to be aware of the limits to its productivity.

I was unable to follow the detailed figures of the knowledgeable gentleman who preceded me, but I get somewhat nervous when we use the fourth year of four worldwide bumper crops in a row to estimate our productive capability. We know that the production in this country of corn, for instance, goes up and down as much as 13 percent above and below normal on the basis of climate alone.

We have had 4 very favorable years, but we cannot depend on those recurring.

Because of this situation, I think we must approach the program with some caution. We think that the production of grain for alcohol to supplement liquid fuel supplies is an important new idea, but it should be a secondary use of farmland.

In those years when the climate has been harsh and food supplies are reduced, and we don't have to remember back very long to remember that, we must stand ready to forego or reduce the production of ethanol to supplement gasoline in favor of food production. That means that we need to do that without causing price competition that drives food products out of the reach of people. Otherwise we are going to be vulnerable to charges that we let poor people starve so that we could drive big cars. I think we need to be aware of that.

The two main causes of our productivity loss are soil depletion and the conversion of farmlands to other uses. I have gone through quite a few figures in this thing that I will not repeat here, but we estimate that the equivalent loss due to the soil erosion—from sheet and real erosion only—on America's croplands right now is the productivity equivalent of around 3.1 million acres a year. It is coming mostly from our class II and class III lands. Those are the breadbasket lands out in the Midwest and the Great Plains that provide so much of our grain.

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Added to that we are losing about 2.9 million acres a year of good cropland through conversion to other uses. This adds up to a total of about 6 million acres a year, or 16,000 acres every day of productivity—of the equivalent of productivity—that is being lost.

We realize that this cannot go on forever without the supply and demand lines crossing. That weather shift that runs back and forth runs the supply of our commodities up and down in an uncontrollable fashion can become more and more important.

It is in light of this declining resource base that we took a look at the program, and we recognize that the sponsors have realized the conservation implications. We would like to suggest an amendment to paragraph 1, lines 3 to 6, on page 15, to incorporate the existing ability of conservation districts in the necessary need to assure that conservation treatment is obtained on the lands used to produce grain under this program.

I will not go into the details of that, but I will only bring out one other point.

Tying this program to a "green ticket" certification could help ease the problem of lands being brought into production. We saw in 1973 the plowout of class IV lands and the corn belt. We are seeing now some of the most severe soil erosion we have seen since the 1930's as a result of that plowout. We need to be very careful in the creation of these new markets to not create that sort of a resource situation again.

That is the nature of the dilemma we face in conservation. We need new markets and stronger agricultural prices, but if we are going to use government programs to get those stronger markets, it seems essential that these be tied to effective resource conservation efforts.

We commend the sponsors of the legislation for working toward that. We will be happy to work with you to achieve that goal.

[The prepared statement of Mr. Sampson follows:]

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Preliminary data from the 1977 SCS National Resources Inventory gives some insights into the erosion loss from the lands currently used as cropland. The survey uses a broad definition of cropland, including row crops, close-grown crops, rotation hay and pasture, occasionally improved hayland, native hay, summer fallow, orchards, vinyards, bush fruit, and "other".

On the 413 million acres included in this "all cropland" category, SCS estimates an average annual sheet and rill erosion loss of some 2 billion tons of soil. Predictably, the rates of erosion are lowest on the Class I lands (just under 3 tons/acre/year average) and highest on the Class IV and VI lands (averaging from 9 tons/acre/year on all Class IVe cropland to a high of 30 tons/acre/year on Class VIe row-cropped land).

A 4-inch layer of topsoil weighs about 650 tons per acre. Although this will vary for each kind of soil, the loss of 4 inches of topsoil will badly compromise the productivity of most cropland, if not make it totally uneconomic to farm. Thus, it seems reasonable to equate the loss of 650 tons of soil to the loss of one acre-equivalent of cropland productivity. The fact that the soil loss is spread over many acres makes it no less a loss, it only changes the shape of the time-curve on which a specific parcel of land will become totally unproductive.

Table 1. Total annual soil loss to sheet and rill erosion, converted to acre-equivalents of productivity lost from American cropland, by capability class

Capability Class	1977 Cropland acres	Annual Soil Loss tons	Productivity Loss acre-equivalents
I	31,529,000	91,244,000	140,000
II	187,702,000	709,722,000	1,091,900
III	131,710,000	709,388,000	1,091,400
IV-VII	62,226,000	506,603,000	779,300
	413,167,000	2,016,957,000	3,102,600

Recent trends in farmland use show that farmers have been slowly, but steadily, moving off the marginal (Class IV-VII) lands in favor of the better farmlands. The erosion figures in Table 1 leave little doubt why: the marginal lands are washing out from under them.

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When we look at the land lost to urban, built-up, and water storage areas, we get an estimate of acres moved out of the cropland inventory on an immediate and fairly permanent basis. Instead of the insidious, unseen losses from erosion that rob productivity so slowly that few notice, the conversion of a tract of prime farmland from corn to houses is clearly apparent.

In the period from 1967 to 1975, it was estimated that about 5 million acres of cropland was lost in this manner, or about 683,000 acres a year. In addition, another 1.6 million acres moved each year from cropland into "other" land, indicating that the magnitude of the impact of land use conversions on agricultural productivity is somewhere in the range of 2-3 times the actual acreage converted at any one time.

In the 1977 survey, with results to be published soon, SCS estimates the average annual acreage of build-up to be about 2.5 million acres. If the trends observed in prior years continue, and one acre is put out of commercial agricultural production for every acre urbanized, we arrive again at the 5 million acre number. If the percentages hold similarly to those seen from the 1975 Potential Cropland Study, Table 2 would indicate the amount of loss likely to be sustained from the different land capability classes.

Table 2. Annual losses of agricultural productivity due to urbanization, water projects, and other building activities in the United States, by capability class, in acre-equivalents.

Capability Class	Percentage of Land Urbanized	Acres Affected	
		Cropland Base	Marginal Land
I	7	350,000	
II	30	1,500,000	
III	21	1,050,000	
IV-VIII	42		2,100,000
Totals	100	2,900,000	2,100,000

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Not all of the 5 million acres of urbanizing land comes from cropland, or land that should be considered to have future crop-producing capability. A conservative estimate of the loss would count only those lands in Capability Classes I-III as having future cropland potential. This would mean that the annual losses of agricultural productivity (Table 2) would be somewhere in the 2.9 million acre range. Adding the two estimates of the losses to productive capacity from erosion and conversion leads to Table 3.

Table 3. Estimated annual loss of United States agricultural productivity, in acre-equivalents, due to soil erosion and conversion to non-agricultural uses, by capability class.

Capability	Loss to Erosion	Loss to Conversion (Acre-Equivalents)	Total Loss	(%)
I	140,000	350,000	490,000	(8%)
II	1,091,900	1,500,000	2,591,900	(43%)
III	1,091,400	1,050,000	2,141,400	(36%)
IV-VIII	779,300	0	779,300	(13%)
Total	3,102,600	2,900,000	6,002,600	

These figures represent a conservative estimate of the magnitude of the loss being sustained from the American farmland base. They are not individual and discrete acres being covered by asphalt or concrete in an absolute and permanent conversion, but they represent the productive capacity being lost each year through the combined forces of soil erosion and land use conversion.

The losses being taken from the American farmland base are not insignificant. Of the 413 million acres currently in the cropland inventory, they represent some 1.5 percent annually. Of the 135 million acres estimated to remain as potential cropland for future use, they represent over 4 percent annually, meaning that the equivalent of the nation's reserve of cropland could be lost in a 25-year period.

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It is in light of this declining land resource base that we must consider the impact of grain production for alcohol. The resource base cannot continue to respond to more and more demands for production. Therefore, we have some suggestions to consider in the bill before you.

All production under this bill must be accompanied by an agreement from the farmer to carry out satisfactory conservation work on his land. You have addressed that situation in paragraph (1), lines 3-6, page 15. We suggest that you incorporate the existing ability of soil and water conservation districts around the nation to assist in that task, recognizing their currently assigned functions under state law. This could be done by substituting the following language for paragraph (1):

> (1) the producers furnish the Secretary a written certification from the local conservation district that such producer is implementing or is making satisfactory progress toward implementing a plan for conservation and sustained use of the soil and water resources of such farm that meets such minimum standards as the Secretary shall establish and such additional standards as the conservation district may establish; and

This change will keep the determinations of appropriate conservation systems with the units of local government assigned conservation responsibility under state law. The conservation districts have the capability of making these determinations, using their long-time working relationship with the Soil Conservation Service for the technical assistance needed to fit conservation treatment to local conditions.

It can be done in a voluntary program, where the producer and the district enter into an agreement as to the appropriate, feasible conservation system for each farm. SCS can provide the necessary technical assistance. Thereafter, so long as the farmer maintains the agreement, the conservation district will certify his compliance. If circumstances change, the agreement can be modified to meet new conditions, yet retain soil and water conservation values.

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Such an approach would make the program established under H.R. 3905 consistent with the Great Plains Conservation Program (P.L. 91-118) and the Clean Water Act of 1977 (P.L. 95-217), as well as with several of the alternative strategies for future conservation programs currently under consideration in the Department of Agriculture under the Resources Conservation Act study.

Tying this program to a "green ticket" certification could help ease another problem as well. There are already too many acres of unsuitable land being cropped. Whenever a new market is created, or agricultural prices rise, more unsuitable land is brought into production.

A "green ticket" program could help on this. It is more economical to apply suitable conservation systems to the better lands, and if producers can not participate in the new program unless they carry out adequate conservation, they may avoid breaking out marginal land. But that still leaves other producers, who may not participate in this program, but who will break out new land in response to the general price rises that could occur from the creation of this new market.

The USDA is currently undertaking an intensive study of alternative methods of administering conservation programs, as called for under the Resources Conservation Act. If, through the Congress' response to that study, we can establish a broadly-based system of conservation incentives, perhaps we can prevent a large-scale plow-up of unsuited lands. That will be relative, however, to the amount of commodity price rise. If prices rise high enough, no conservation incentive program will prevent a massive plow-up, and this committee may need to consider some other approach, such as a restriction on the sale of commodities from new land unless a conservation certification is obtained from the conservation district.

This is the nature of the dilemma we face in conservation. New markets and stronger agricultural prices are badly needed. But if we are going to use government programs to create stronger markets, it seems essential that these programs be tied to effective resource conservation. We commend the sponsors of this legislation for working toward that end, and commit ourselves to assist you in finding a workable, realistic approach.

We would be pleased to answer any questions you might have.

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Mr. ROSE. Thank you.

Congressman Bedell?

Mr. BEDELL. Mr. Sampson, you are aware that we do have a conservation provision in our bill, are you? It requires strict conservation practices.

Mr. SAMPSON. Yes, sir. I have suggested that you incorporate the conservation districts in that provision to make that compatible with what is in Great Plains and some other legislation.

Mr. BEDELL. I would only mention to you the study that was made at the University of Kentucky which, in a nutshell, indicated that you could take corn and take alcohol from 20 percent of that corn and feed it to cattle, not losing any of the feed value. If that is indeed confirmed and correct, I presume it would change some of the statements you have made here in regard to losing food in order to make fuel.

Mr. SAMPSON. It certainly makes a difference. That, of course, depends on whether or not you can do the corn processing where you are going to do the cattle feeding or move the product back and forth economically, obviously.

Mr. BEDELL. Yes, I agree.

Mr. Jawetz, I was delighted with your testimony. It appears to me you have really captured everything as far as I am concerned with regard to this problem.

There were two things I am glad that you brought out. One was that distilleries, if they are made to use grain to produce alcohol, could be converted at the front end for cellulosic materials if that came into being.

Second, I think you put a handle on the energy conversion factor better than anyone I have ever heard. That is really not talking about just Btu's. We are talking, first of all, about what we put in to heat the product because certainly we have more coal than we have oil. We are also talking about how much work the final product can do which is significantly more than the Btu's that are in the alcohol. So, I want to commend you for that. You have done a great job, Mr. Jawetz.

Mr. JAWETZ. Thank you.

Let me add this at this point. I have testified at hearings at DOE against the deregulation of gasoline or the tilt, not for the reason that I was interested in keeping the price of gasoline low. I think we should allow it to get closer to $2.50, like in Europe. But that is beside the point.

The explanation for the need for an increased price of gasoline is what the Secretary of Energy has called the need for additional refining capacity. That is wrong. We are not short of refining capacity. We are short of something called reforming capacity where you take the straight chains of the fuel and you form benzenes and the toluenes. This particular process is energy intensive and there is a lot of crude in order to prepare that benzene and toluene. Why not save that crude oil? What API wants us to do is to increase imports of oil to this country by 6 percent in order to let them boost the octane value by ways they know best.

Mr. BEDELL. Thank you. I yield back my time.

Mr. ROSE. Thank you. Mr. Fithian.

Mr. FITHIAN. I have no questions.

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Mr. ROSE. I want to thank both of you, Mr. Sampson and Mr. Jawetz, for your contributions.

In Mr. Bedell and Mr. Fithian we have two of the brightest Members of Congress and also two who happen to feel very strongly about this particular subject. I can assure you that with their guidance these subcommittees will look very closely at this subject. We may be calling upon both of you again to come and testify.

With that, we will recess until 2 o'clock this afternoon.

I want to thank you all very much.

[Recess taken.]

AFTERNOON SESSION

Mr. BEDELL [acting chairman]. The subcommittees will come to order.

Our first panel is with the National Farmers Union. We have Neil Oxton, president of the Nebraska Farmers Union; Harold Dodd, president of the Illinois Farmers Union; and Curt Sorteberg, assistant to the president, Iowa Farmers Union. Mr. Reuben Johnson will proceed with introductions.

Mr. JOHNSON. Mr. Chairman, I am Reuben Johnson, director of legislative services. Curt Sorteberg will be appearing for the president of the Iowa Farmers Union. He is assistant to Lowell Gose, the president.

Dale Lyon had hoped to be here from Kansas. I gave a copy of his testimony to the clerk. I would like to ask that his statement appear in the record following the statements of the panelists.

Mr. BEDELL. Thank you. Without objection, it will be entered in the record at the appropriate place.

In the interest of time we should say that we have nine different panels and/or individuals to appear here this afternoon, so we would ask, wherever possible, that people make their presentations as short as possible in order to give some time for questions and answers.

Gentlemen, you may proceed as you see fit.

Mr. JOHNSON. Mr. Chairman, my panelists are in order, and I would like to present Mr. Neil Oxton, president of the Nebraska Farmers Union.

STATEMENT OF NEIL OXTON, PRESIDENT, NEBRASKA FARMERS UNION

Mr. OXTON. Thank you, Mr. Chairman, and members of the committees.

I am Neil Oxton, president of the Farmers Union of Nebraska. I appreciate the opportunity to appear before these House Agriculture subcommittees today to present the views of the farmers and rancher members of Nebraska and National Farmers Union on the proposals before this committee to develop gasohol.

The members of the National Farmers Union are independent family farmers and ranchers. I think it would be fair to say that our organization represents a good cross-section view of operating farmers and ranchers throughout the Midwest, South, and North Central regions of the United States mainland. A high percentage of those farmers and ranchers are impatiently watching and wait-

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ing to see what our Government is going to do about developing alternate forms of energy.

Our National Farmers Union convention held in Kansas City March 12 through 14, 1979, had the following to say concerning gasohol:

> An alcohol fuel program utilizing renewable resources should be established through low interest Federal loans, in the same way rural electricity and rural telephones were established.
>
> * * * the use of renewable resources will save substantial amounts of oil and stabilize and improve farm income. Special emphasis should be given to production systems stressing on-farm and local cooperative site development.

In our State of Nebraska, we have investigated, studied and tested the feasibility of gasohol for the past decade. Farm organization leadership, our Governor, and our Department of Agriculture are anxious as can be to take the necessary action to expand on the use of surplus grain in gasohol production.

Gasohol can reduce our annual dependency on gasoline by at least 10 billion gallons. That is 9 percent of our present consumption today.

Mr. Chairman, in addition, alcohol fuels boost gasoline octane. Gasohol can help alleviate shortages of unleaded gasoline which is one of the types that is short here in Washington, D.C., this past weekend.

Recent developments by Chemapec, Inc., a worldwide alcohol plant manufacturer of Woodbury, N.Y., indicate that it will take somewhere between 15,000 and 20,000 Btu's to produce a gallon of 200-proof alcohol from corn.

Let us assume the high figure—20,000 Btu's. This equates to between 75,000 and 85,000 Btu's from 1 gallon of alcohol.

Further, more than one-third of the corn processed into gasohol will become food byproduct. Whether human or animal consumption is another consideration.

Farmers, their cooperatives, and several private companies have been, and are continuing to study the possibilities of going ahead with plant development. Once the priority selection process is determined here in our Nation's capital, we can move ahead to building plants and, hopefully, not in a helter-skelter, ill-planned manner.

We need federally guaranteed loans. No one in his right mind is going to spend millions of dollars with the present imponderables staring him in the face.

Even today in the Wall Street Journal, on the last page in the "Heard on the Street" column, Steven Manelli, an analyst for Davis Scagg & Co., is quoted as follows:

> You have to be a very risk-oriented company to commit production to gasohol, and you have to be sure future legislation will favor you.

We all are confident that the oil companies are not interested in developing alcohol fuels. Their opposition, however, ought to be some sort of an indicator to us.

But our own Government seems to be bound up in a cheap food policy. USDA has been slow to act in a positive manner. Although food may seem to be high to consumers, the farmer who produces abundant food, plus a surplus of grain, is not receiving a fair return for his investment and labor.

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We may well dedicate a closed gasohol plant as a monument to $4 corn some time in the future. We would applaud any step made in that direction. However, the best we see presently is $2.10 to $2.25 per bushel for corn.

Further, we are confident our farmers will be able to respond to the challenge to produce more corn provided they can do so profitably.

We in the Farmers Union are concerned for all America. We do not wish to profit at the expense of our fellow Americans. We are not here requesting an advantage that we would not ask for all citizens. What we are proposing is a challenge to government to provide leadership and the necessary credit.

America's farmers will respond to this energy crisis. We can and will help provide the needed alternate sources of energy. In the process of doing this, we hope to save America's family farm system as well.

Thank you, Mr. Chairman.

Mr. BEDELL. Thank you, Mr. Oxton.

Mr. Dodd, will you please proceed.

STATEMENT OF HAROLD DODD, PRESIDENT, ILLINOIS FARMERS UNION

Mr. DODD. Thank you, Mr. Chairman, and members of the committees.

I am Harold Dodd. It is indeed a pleasure for me to appear before this esteemed group to support the concept of using renewable, clean burning, agricultural ethanol to reduce the serious short fall of liquid petroleum that has appeared throughout America.

Current plans that call for the American public to change their way of life by either doing without or by reducing their operations can only lead to serious economic problems for all of our country.

Past American experiences using renewable agricultural ethanol have all indicated agriculture had the raw sources needed for the fuel. Starting early in 1970, Nebraska's leadership reconfirmed and documented the ease of use, the higher octane and clean burning qualities, as well as showing ethanol improved the burning of the gasoline it was mixed with so that mileage is improved.

The leadership in Illinois recognized the past experiences but went the next big step. This was to start the commercialization of the use of fuels containing 10 percent renewable ag ethanol, trademarked and called gasohol.

The day I stood at the Top Quality Service Station in Zion, Ill. with Senator Adeline J. Geo-Karis and Gilbert Fricke, superintendent of markets, Illinois Department of Agriculture, and witnessed the first 50 gallon drum of Wisconsin cheese whey ethanol be mixed with 450 gallons of gasoline was really a historic day for America, its citizens, and more particularly, its farmers.

This was the day the American farmer started his new role as a producer of energy. For years we have been the world's supplier of food and feed energy, but now add fuel energy. From that 50-gallon start, current production of fuel ethanol is in the thousands of gallon per day in Illinois alone.

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This concept of using a fuel that starts with the carbon, hydrogen, oxygen, rainfall and sunshine, add photosynthesis, and then put it in the hands of America's best solar engineer—the American farmer—was long overdue. He places a seed in the ground, watches it grow into an ear, a potato, a wheat or milo head, a sugar beet, or whatever, and then processes it into food, alcohol, and feed.

Either through ignorance or careful planning, the leadership of our Government has been suppressing agricultural production and agricultural markets. Since 1954 agriculture has been suffering under survival programs. Set-aside programs with inadequate incentives have been the goals. All this time we in agriculture and America have suffered economically.

The concept of using the renewable starches for fuels, the establishing of market prices above production costs, and allowing American agriculture to fill its third role as an energy producer was long overdue.

I compliment Congressman Bedell and the others in leadership who have brought this concept to the forefront.

America's development of this new fuel program is the only thing it has going for it that will break the stranglehold OPEC and the oil people have on us.

Basically in 1973, 1 bushel of our Illinois corn bought 1 barrel of foreign crude oil. At that time we were sending 2½ gallons of ethanol, 2 pounds of oil, and 16 pounds of protein for 20 gallons of gasoline and other heavy oils. Two and one-half gallons of liquid fuel for 20 gallons—not a bad deal.

Times started changing then, and now in 1979, the American petroleum industry reports that in spite of posted prices, most of the foreign oil is going to the spot cash market. It now takes about 10 bushels of Illinois corn to buy 1 barrel of foreign oil.

We now send 25 gallons of clean burning, high octane, renewable ethanol to get back 20 gallons of dirty gasoline. No longer is this a good deal. In addition to going backwards in relation to volume of fuel, we also send 20 pounds of food oil and 160 pounds of high protein. This is worth about $17.50. This with the ethanol worth $37.50, means we are sending $50 to get back $25. This has been historic with the way the Government has been using agricultural production.

The program should be established so the feed grain bases will not be exceeded at the present time. I don't like to see two programs tied together like conservation and production. However, everyone must take a necessary step to assure conservation programs remain intact and are improved.

The concern of some that we cannot meet the raw source needs do not really know much about the American farmer. They are well studied, thinking businessmen, and if an imbalance in any crop occurs, it will be corrected in the next planting season.

The raw source material for ethanol is so diverse that every State has one or more crops that can be used. Potatoes of Maine, sugar beets of Colorado, wheat of Kansas, milo of Texas, sugarcane of Florida, Puerto Rico, and Hawaii, cheese whey of Wisconsin, sweet potatoes of Georgia, wood sugar of Vermont and Washington, et cetera.

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On behalf of farmers in general, and Illinois farmers in particular, I assure you we can meet any goal you establish for food, feed, and fuel.

Public acceptance has shown the use of ethanol is viable. Talk of rationing here in the Halls of Congress indicates new fuels are needed. Only the dragging of feet in the USDA, DOE, EPA, and some leadership has prevented ethanol now being able to fulfill the shortages that are occurring across our country.

If this program is accepted, please put some dates on it that will make the program immediate. We cannot wait. We can get conservation of nonrenewable gas by substituting renewable ethanol. We can stop the flow of deficit American dollars for high-priced foreign oil. We can save America.

In conclusion, let me say this, Mr. Chairman. At least in Illinois the idea and product has widespread support. The environmentalists like the clean air aspects and the conservatives like the increased mileage. The general public appreciates the use of homegrown supplies versus depending on OPEC nations. Agriculture also appreciates a new use for its product. The problem lies in getting more production plants into being.

Thank you very much.

Mr. ROSE. Thank you, Mr. Dodd. We appreciate your testimony.

Our next witness is Mr. Curt Sorteberg, assistant to the president of the Iowa Farmers Union.

Mr. Sorteberg, please proceed.

STATEMENT OF CURT SORTEBERG, ASSISTANT TO THE PRESIDENT, IOWA FARMERS UNION

Mr. SORTEBERG. Thank you very much, Mr. Chairman.

I would first like to say that our president, Lowell Gose, could not be here today. He wanted to express to Congressman Bedell that he was very interested in coming but the good weather and the fact that he had a chance to get into the bean field apparently overcame his zeal to come before this committee, so he would like to extend his apologies.

Iowa Farmers Union is pleased to serve on this panel on behalf of the National Farmers Union in order to examine the merits of the National Fuel Alcohol and Farm Commodities Production Act of 1979 which has been introduced into the Congress by Congressman Bedell. We had asked for a copy of the most recent version of the legislation, but did not receive it before preparing this testimony. We did contact Mr. Dave Hallbert by telephone, and we believe that we do have the most current provisions. We apologize for any redundancies, however, on any provisions which may have been changed.

Earlier this year on March 16, the Iowa Farmers Union participated in a seminar sponsored by Congressman Bedell at Storm Lake, Iowa. At that seminar we presented our views on the legislation as it had been introduced at that time. Since then many changes have been made in the bill, but many of the features are still essentially the same. Congressman Bedell, we ask for your indulgence on any material which is repetitious because some of it is bound to be from that particular hearing.

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Present depressed grain prices have focused much attention on the need to reduce stocks, and gasohol is being seriously considered as one method to expand markets. Farmers Union, at both the State and national levels, has given concentrated consideration to the potential of alcohol production, and the Iowa policy statement and the NFU program of policy and action contain sections on this issue.

Present economic conditions have enhanced the prospects for an alcohol fuels industry in the United States. Grain prices are at low levels, far below parity and even below the cost of production for some commodities. Net farm income, even though it has risen this year in current dollars, is at near-depression levels when inflation is factored in.

Most recent estimates from the USDA are that net farm income will be about $28 billion for 1978. In 1967 dollars this is only $14 billion. In 1950 net farm income stood at $17.8 billion in 1967 dollars. It is apparent that agriculture has been deflated by nearly $4 billion constant dollars since 1950 in terms of the purchasing power of its production.

Farm debt is expected to exceed $150 billion by the end of this year, and this is another serious indication that the agricultural economy is not keeping pace with inflation. Effectively, farmers are capitalizing the inflation in their land values to offset shortfalls in income from their production. When carried to extremes this is a scenario for disaster.

The beef market has been much stronger recently, but cattle producers had suffered 3 years of losses. Hogs, also, have been bringing profits, but price forecasts for this fall are not very good. Some analysts are predicting that hog prices may sink to levels below the cost of production. The situation in the hog production sector confirms an old axiom: Cheap grain brings cheap livestock through over expansion.

This economic backdrop in agriculture is very important in discussing any legislation designed to remedy the situation. Action to increase grain prices is certainly long overdue. But the question must be asked: Is this legislation the best solution to the problem and is it the only one?

Another impetus for competing, nonpetroleum, liquid fuels development is the increasing cost of energy to farmers. Our NFU Washington office estimates that the OPEC price increases and the proposed decontrol of prices of oil will raise the tab for energy that farmers use by over $1 billion. The multinational, integrated energy corporations are gouging farmers and other consumers alike, and there is a dramatic need for increased competition in the industry. But again, we must ask: Is this legislation the best solution or only solution to the energy ills?

The questions concerning the legislation have been repeated for a specific reason. We have been disturbed by some of the press releases that have been issued in connection with the bill. From an April 20 release: "With commercial development of agriculture, we will finally be able to remove grain subsidies, and get the Government out of the grain business."

Although we feel that the proposed legislation has considerable merit, there is no way that an untried legislative mechanism can

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substitute for farm programs. It can be a helpful addition, but to suggest that the bill will eliminate the need for involvement by government in agriculture is specious. This kind of simplistic, economic propaganda only detracts from the merits of the legislation, and it should be discontinued.

Government involvement in agriculture has been a political football that has been kicked around by administrations on both sides of the aisle. The truth is that there is less government involvement in the food system in the United States than in practically all of the other nations of the world. This legislation would require responsible and defined involvement by the USDA to make it work. It is hypocrisy to accompany an expanded Government program with a call for getting the Government out.

Nevertheless, we can appreciate the frustration of members of this committee with present farm programs. The Carter administration has refused to allow any improvements in the current Farm Act, allegedly because high commodity prices would fuel inflation. At the same time, the USDA admits that 75 percent of the food cost increases since 1967 is attributable to marketing costs after the food has left the farm. This ambivalence has made it very hard for the Congress to be responsible in raising price support levels to needed levels.

The impact that this act would have on the energy supply situation is also small. The estimates that we have heard quoted is that this program, if it is enacted, would produce volumes of alcohol that would amount to about 3 percent of the total liquid fuels usage. This is not an insignificant amount, but it should be recognized that this will not solve the present energy crisis. Further legislation will be needed to break the oligopolistic energy companies, provide more support for solar and other alternate sources and come to grips with the need for a comprehensive conservation program.

Recognizing that an alcohol fuel program will be only a partial solution to the farm economic problem and the energy situation, let us now turn to the proposed legislation itself. The major provisions of the bill will be analyzed according to our understanding. Writing a bill on such a complicated new program is not easy, and our questions and comments are designed to be helpful.

The best improvement made in the legislation since we participated in the seminar in March is the increased lead time. To our knowledge, the main provisions of the legislation would not go into effect in 1982 with a phase-in program planned for the interim. We were very concerned that the program would be made mandatory before the plant production capability would be established. To abolish the set-aside authority is questionable under any circumstances, but to do so in 1980 would have been very premature.

Even with the expanded leadtime, we have extreme reservations about doing away with the set-aside authority. Congressman Bedell's staff estimates that the program could handle up to 750 million bushels of corn. But because other grains and substrates can be used, we feel that a set-aside may still be necessary in the future because the full amount of corn may not be utilized.

One of our primary concerns is the effect that this program would have on conservation. It is one thing to give the Secretary of

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Agriculture the power to enforce "approved soil conserving uses and best management practices." But the bill does not define the procedures by which the Secretary would enforce this provision, nor does it establish a procedure for the promulgation of rules, other than the ASCS committeeman administrative route.

Politically there would be problems with the conservation section. If the administration is unwilling to create adequate incentives to idle land through the set-aside diversion route, it is highly improbable that it would use a policy power. Of course, the legislation would not go into effect until 1982, but the procedures should be defined better. Land is already being cropped that should be left in pasture, and it would be undesirable to create another incentive for fence-row-to-fence-row farming.

It is our understanding that the established price which would go into effect in 1982 would be $2.75 per bushel. The present target price is $2.20. This is only a 25-percent increase. We are running nearly double-digit inflation in the economy right now. If we look at the parity price for corn as of March 15, 1979, it was $4.08 a bushel. So, we are more and more lagging behind.

We have an agriculture economy that is in a state of deflation. That deflation is going to have to be ended. We are sort of in a poker game where we are solving the problem where someone is drawing off of the pot, by getting rid of the players.

We have lost a lot of farmers since 1950. So this is very important.

Another section of the bill which concerns us is the guaranteed and subsidized feedstock provisions. Originally, the bill would have given subsidized feedstocks only to the plants qualifying for loan guarantees. It is our understanding that the feed which is bought from farmers at the established price will be sold to plants at 80 percent of the established price. For corn at the $2.75 per bushel established price, a subsidy of 55 cents a bushel will be granted to the processors.

We are not opposed to the subsidy, per se, but we want to be certain that it does not go to large established plants instead of to farmers and other smaller operations. The legislation presently gives preference to those receiving guarantees in the distribution of the subsidized feed stocks. But it permits the Secretary of Agriculture to sell the stocks to other processors after the needs of the producers with guarantees are met.

In our NFU policy statement, on-farm and local cooperative production systems are stressed. It is critical that any subsidies granted should be either to farmers themselves, local cooperatives or to small energy companies. It would be ironic and disgusting if this subsidy helped the large energy companies extend their oligopolistic control of energy to alcohol production.

The provision which directs an 18-month study on the DDGS—the dried distillers grain and solubles—is an important part of the bill. The high protein feed which is obtained from the fermentation of corn to produce alcohol could disrupt the existing protein supplement market, especially soybeans. This is one crop which has returned a profit to producers in recent years, and care must be taken to avoid a bust of this market. The low corn prices and the

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low sugar beet prices are already resulting in large shifts to soybean production. The DDGS would be another bearish pressure.

In the February 15 bill draft, there was a provision that alcohol plants would have to turn over the DDGS to the USDA at no cost if the Secretary so requested. The present bill, I am told, provides that the Secretary of Agriculture will negotiate with the alcohol producer to purchase the DDGS. Because a processor would not want to give the DDGS away, this change is understandable, but a problem is created.

Also in the earlier version was a requirement that the Secretary release DDGS stocks in such a manner as to not disrupt other protein supplements. Now, the DDGS stocks will be in the hands of the private alcohol plants, who may sell the high protein substance at lower prices because it is a byproduct. Because the plants are utilizing subsidized feedstocks, it would be unfair to soybean producers to have their commodity prive depressed by the DDGS.

Of course, the actual magnitude of the DDGS on the market will be dependent on the volume of alcohol that is produced and many other factors. That is why it is very important that these considerations be included in the study which is to be considered by the Secretary of Agriculture.

The guarantees are a good incentive to get the alcohol plants on line, but there is another need which is not addressed by the legislation. We would recommend that some modest funding be established for pilot plants to be construed at various locations in the country. These plants could serve as focal points for those interested in constructing their own, and they could serve as educational projects as well.

If extraordinary efforts are not made to encourage plant construction by farmers, cooperatives and smaller energy companies, the probability is that established energy companies will dominate the new industry. In addition to the guarantees, an aggressive program of promotion will have to be conducted to seek out the kind of people the act is designed to help.

We are pleased to see that the bill requires a positive net energy balance. Our NFU policy states: "We urge the Department of Energy and other agencies to use net energy standards in evaluating energy sources so that accurate comparisons can be made * * *"

It is important enough to determine net energy production with petroleum, but it is crucial with corn and other crops because of the obvious alternate use as feed for livestock.Petroleum is not usable in an unrefined state, but corn and other feed grains have direct uses. Energy production for grains must be considered a secondary use, and net energy requirement will help assure that.

Another economic aspect which should be considered is the grain reserve which is presently in existence. We have been informed that this legislation would not repeal the authority for the reserve, but the mechanics will have to be spelled out. To our knowledge, the loan level would be raised to $2.10 per bushel. This would be the effective floor in the market, but the expectations are that the increased demand would hold the market price higher, probably closer to the established price. The low loan level would probably act as a disincentive for farmers to participate in the reserve.

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I am not sure of the exact answer, but feel that the legislation must address this situation. It would appear that the authors of the legislation feel that a reserve is necessary, but the essentials are not delineated.

A related topic in connection with this issue is the adjusted cost of production which will be used as the escalator for the established price. The cost of production which is defined in the bill does not include any land capitalization costs. We feel that this will create an unrealistic escalator, especially for young farmers. It is tempting to leave this factor out because of the complexity involved, but it is a very necessary consideration if we are to maintain the family farm system in agriculture.

When we send out membership notices each year, it is surprising how many notices are returned to us marked "no longer farming." Entry into agriculture by new farmers must be a criterion of every piece of legislation. It is important to treat the symptoms of a problem, but the causes must be examined if a permanent solution is to be reached.

Incidentally, Congressman Bedell has introduced a bill on that which we appreciate and applaud him for. It is very important.

Even though we have expressed several reservations about the bill before the committee, we sincerely believe that it is a step in the right direction. By holding these hearings you are allowing us to suggest improvements in the act, and we hope that you will accept these suggestions in the spirit they are intended.

Gasohol is not a panacea. This legislation will not get government out of the grain business. It will not negate the need for conservation program incentives. It will probably not negate the need for set-aside authority. It will expand demand at a time when grain prices are severely depressed. And it will, if properly directed, restore some competitive forces to the energy production sector.

Thank you for the opportunity to appear before you today. We will be glad to respond to questions.

Mr. ROSE. Thank you very much for your testimony, Mr. Sorteberg.

Mr. Johnson, we are always glad to hear from you and your people. We thank you for bringing the gentlemen to us.

At this point, without objection, we will insert the entire prepared statement of Mr. Dale Lyon, president, Kansas Farmers Union, into the record.

[The prepared statement of Mr. Lyon follows:]

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National Farmers Union

"FOR THE RECORD"

TESTIMONY OF

DALE LYON, PRESIDENT
KANSAS FARMERS UNION

TO THE

JOINT HEARINGS OF THE SUBCOMMITTEES ON
DEPARTMENT INVESTIGATIONS, OVERSIGHT AND RESEARCH
CONSERVATION AND CREDIT
LIVESTOCK AND GRAINS

OF THE

U. S. HOUSE AGRICULTURE COMMITTEE
WASHINGTON, D. C.

May 15, 1979

Mr. Chairman and members of the Joint House Subcommittees, I want to commend the members of the three House subcommittees sponsoring these hearings on the National Fuel Alcohol and Farm Commodity Act of 1979. It illustrates the responsiveness of the Congress to the growing concerns among farmers regarding the ever-escalating cost of fuel.

In Kansas, there is widespread interest in ethyl alcohol to be used in powering farm machinery, both as an alternate source of renewable energy and a legitimate market for farm produce.

I am glad to see the Congress contemplating taking steps to aid farmers and cooperatives in producing fuel alcohol. As we all know, perhaps the best incentive in the world is an economic incentive. And with the rapid increase in diesel fuel and gasoline prices, the economic incentive for famers to develop fuel alcohol is readily apparent. This bill would add to that economic incentive by providing Federal-guaranteed loans for establishing fuel alcohol production facilities. The guaranteed loans should be structured to include ethyl alcohol plants.

The significance of these guaranteed loans cannot be understated.

As I said, there is widespread interest in the development of ethyl alcohol for farm fuel, but that interest, however, is contingent upon who controls the development of that alternate source of farm fuel.

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I can tell you that farmers in Kansas are united in the belief that fuel alcohol control must not fall into the hands of Exxon, Mobil Oil, Phillips Petroleum, Standard Oil, or any of the big oil companies.

The development of fuel alcohol must remain in the hands of small individually-owned, on-farm units, or farmer-owned cooperatives. Otherwise, in my opinion, farmers will lose interest in fuel alcohol rapidly.

That is why the bill currently before this Joint Subcommittee is significant. It provides an economic incentive to encourage farmers to invest in the fuel alcohol production business.

The idea of the guaranteed loan for fuel alcohol production facilities is an idea rapidly gaining acceptance President Carter recently embraced this concept while speaking in Iowa and the hearings being held by this Joint Subcommittee reflect that same interest.

In Kansas, the Farmers Union began studying the practicality of establishing Farmers Union energy co-ops in March of this year. In April 1979 the Board of Directors of the Kansas Farmers Union approved a plan to establish an energy co-op committee to begin a step-by-step analysis of the available technology in fuel alcohol production. Hopefully, the end result will be the founding of numerous energy co-ops in the state of Kansas to deal in fuel alcohol production as well as other alternate forms of energy.

Included in this cooperative made up of 15 to 20 farmers will be methane conversion units Ideally, most of our cooperatives will be close enough to cattle feeder operations to cut down transportation time of the by-product of the ethyl alcohol production units to the feeder operations and the livestock waste back to the cooperatives' methane conversion unit

In addition, there wil be supplemental solar and wind power facilities as a small part of the Kansas Faremrs Union energy co-ops.

Farmers Union was responsible for founding a vast majority of the co-ops currently operating in this country. Although our energy co-op idea is in the fledgling stage, it is an idea our members are serious about and deeply interested in.

I do not feel that this bill should be looked at as a replacement of current farm programs, but rather as a means to break the stranglehold foreign oil dependence has created in this country. It is time to act before this dependence on foreign oil inhibits or interrupts the food production in the country And that day will surely come unless something is done to ease dependence of foreign oil, spelling disaster for this country and the world.

Thank you for this opportunity to submit my views.

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Mr. ROSE. Are there other questions from members? Mr. Harkin.

Mr. HARKIN. Mr. Chairman, I have no questions, but it is good to see some good old friends at the table. I am sorry for being late but there are some automobiles at the Capitol and some have engines that will burn gasohol quite well.

Mr. ROSE. Congressman Hagedorn.

Mr. HAGEDORN. I have no questions, Mr. Chairman.

Mr. ROSE. Mr. Bedell.

Mr. BEDELL. I want to commend these gentlemen for being here. Mr. Sorteberg, we have changed several things which you mentioned. For example, the guarantees for feedstocks did not go in the new bill only to those who get loans. They go to everyone as well. We appreciate your constructive comments, and we would indeed like to have a bill that is as good as possible. Particularly, Mr. Dodd, I am appreciative of your comparison of the import of oil with what we are sending over and what we are getting back.

Mr. ROSE. Thank you, Congressman Bedell. Mr. Fithian.

Mr. FITHIAN. I have no questions, Mr. Chairman.

Mr. ROSE. Mr. Glickman.

Mr. GLICKMAN. Thank you, Mr. Chairman.

Let me ask a question. You talked a little bit about soil conservation and a few other things. I am a supporter of the Bedell bill. Some people believe it is a step toward a massive change in the farm economy whereby production of food and fuel would become equal partners in American agriculture which would necessarily mean some substantially expanded production of farmland for fuel purposes. As a policy matter, I wonder if you might comment whether you are supportive of that change.

Do you believe that alcohol fuels have such a promise that we ought to encourage, on a permanent basis, the production of farmland for fuel purposes as well as for food purposes, or should this be on some sort of emergency or stop-gap or shortage situation?

Mr. OXTON. Let me say, Congressman Glickman, that we feel that could balance out well. We see it in Nebraska with the surpluses that are created. They could go to energy production.

As I said in my statement, our farmers, if challenged, could produce a lot more corn if need be. I hope that answers your question.

Mr. DODD. Although we do not grow potatoes commercially in Illinois, let me give you an example. I do have friends who do grow potatoes in other States. Almost without exception every year there are literally millions of bushels of potatoes that end up not being fit to sell for human consumption. They shrivel and sprout. This product could be used to supply the Nation with energy. I see it as such a versatile use. So many products could be used to produce it. It would almost fit every State in the Union.

Mr. GLICKMAN. In order for gasohol to have a predictable, stable, and continuous influence into the marketplace, then we have to have this. The Bedell bill is the first step toward a national policy of encouraging production of cropland for fuel purposes. I know, for example, that the Brazilians have the experience with sugarcane and related crops. There are vast areas of this country where we could produce sugarcane that is not being produced now.

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Do you see the future of the Bedell bill as a first step toward some sort of predictable stable production of cropland for fuel purposes?

Mr. SORTEBERG. Let me respond to that. In this respect I feel this way. I think among our States we have different ideas on this. I look on it as a secondary use. I think farmers are far more comfortable raising food for food and feed grains for livestock.

I think one of the reasons we have stressed the local cooperative and on-farm production is that we would hate to see a mass of capital investment created in that kind of production capacity that would then fuel low-priced feedstocks. It would become deterministic to creating an effective ceiling on grain prices. I would say it could be a substantive role for farm folks, but they feel a little more comfortable in their traditional food-producing and feed grain-producing capacity.

Mr. GLICKMAN. Thank you. This is a profound question that we will have to deal with in the next few years. I appreciate your responses.

Mr. ROSE. Thank you. Congressman Daschle.

Mr. DASCHLE. In the interest of time I will limit my questions to two. Let me clarify your position with regard to the provision requiring that producers sell 10 percent of their crop at the established price which is in the bill for the production of alcohol.

You made it very clear what your position is on the price, but what do you feel about the concept itself of selling 10 percent? Do you feel that this is something that goes against the grain of most farmers in Iowa? I address that question to Mr. Sorteberg, I suppose.

Mr. SORTEBERG. No, I do not think they would object to earmarking 10 percent of the crop. More importantly, there is the question of price. Also from our standpoint where the subsidized feedstock would go is important. We would hate, for instance, for it to go to the established energy companies to extend their oligopolistic influence. We would like see some new energy people in the arena to create some more competition also.

I do not see that 10 percent would give us trouble. It depends on world demand and also on weather, but with the present large carryover that we have, I have not found any Iowa farmers I visited with who were uncomfortable with the 10 percent being earmarked. In fact, there is enthusiastic support for that kind of concept.

Mr. DASCHLE. Mr. Johnson, let me ask you this.

You are affiliated with Cenex. I would like to know if you can tell us what production, that is, I should say the retail distribution levels of gasohol have been at the Cenex stations around the country. Can you tell us that?

Mr. JOHNSON. Not in detail, Congressman. I do know that in the recent series of meetings that I made in South Dakota—I believe it was in Watertown—I was in a Cenex station and the cooperative manager there had put in blending equipment. He was buying ethanol from the Archer Daniels Midland distilling operation.

He was enthused and I had quite a discussion with him about whether he could get financing to build one in his area. He cited

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the need for it based upon the fact that he could use corn that was not up to the standard of moisture content required for CCC loans.

Furthermore, he was living out there in the midst of 5-mile-an-hour railroad truckage. He would envision saving time in shipping grain and the cost of shipping grain which is 30 cents a bushel or so to the Twin Cities. He could see the economics of it.

Let me say that there is another facet of this that I am intrigued by, having been reared in the mountains of Georgia. We learned how to distill grain down there a number of years ago, and we actually burned it in old Ford tractors and model-T Ford cars.

Mr. DASCHLE. Is that all you did with it?

Mr. JOHNSON. We had some other uses.

Probably these were more enjoyable. However, the point I would like to make, Congressman, is this. I do not think we should ignore this at-home distilling procedure which has already been tested by Mr. Lance Crombie of Webster, Minn.

I think there was an interview in Plowboy magazine. I thought it was interesting. I think there must be some potential to farmers using some of their starchy produce. It does not have to be grain. This would be an on-farm ethanol-type of facility. I would think that the committees should address at least the potential.

Mr. DASCHLE. Others will be discussing it later on this afternoon.

Mr. JOHNSON. I am happy to hear that.

Mr. DASCHLE. Let me commend Cenex because I think they are one of the leaders, in the Midwest anyway, with regard to marketing gasohol. If you have any statistical information with regard to this, then I think that we should have it. The Cenex station in my district is selling about 1,500 gallons a week. He would sell more if he could get more. I think that is indicative of the kind of demand there is for the product.

Mr. JOHNSON. Part of the reason why he has been able to market that quantity and use more is the fact that farmers are very interested to cooperate in the consumption of gasohol products. It has a very good market acceptability. I foresee the co-ops providing the leadership in some of the marketing aspects that need to be perfected as we move into this field.

Mr. DASCHLE. Thank you. Thank you, Mr. Chairman.

Mr. ROSE. Thank you. Gentlemen, we want to thank you very much for being here.

Our next witness is Mr. Don Kelley, manager of the Farm Bureau Cooperative Association, Portland, Ind.

Mr. Kelley, you may proceed.

[The prepared statement of Mr. Kelley follows:]

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Jay County
FARM BUREAU
COOPERATIVE ASS'N, INC.
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PORTLAND, IN 47371

If we used corn for alcohol production, food prices for human consumption would probably increase and the multitudes would look very unfavorable at this.

I strongly favor the use of alcohol to relieve our energy problem, however, I feel a cheaper alcohol can be manufactured from cellulose without disrupting the feed and cattle industry. I also feel that alcohol must be cheaper than it is today before it can be considered for use on a large scale. If alcohol can be made to be competitive, and I believe it can, untold new uses for this product will open up. The use of cellulose materials would also open up new sources of income for agriculture.

With proper rotation, a sound fertilization program, and good old common sense, we can use these renewable resources without depleting our soil. Agriculture needs the extra income and also has the ability and desire to produce and gather the cellulose needed. A speeded up effort needs to be put forth by the people working on the perfecting of the cellulose breakdown process.

I am at the present time adapting a 1968 Dodge Polaro to run on straight alcohol. I am not an engineer, but I feel that with good old fashioned ingenuity, we can mass produce cars and trucks to run on straight alcohol of a lower than 200 proof grade which would in itself lower the alcohol cost. The biggest problem facing the auto-makers is not how to do this but where does the consuming public purchase the alcohol. For this problem to be solved, we need many alcohol plants, situated close to the source of the raw material and in a location so as not to have a high transportation cost.

This is where the big problem arises. Because of the fact that this is something new and untried on a large scale, money lending institutions are reluctant to lend the necessary large amount of money to put these plants on stream. Also, because of this same fact, it is difficult to get corporations to obligate themselves toward this venture. For these reasons, I feel a program must be initiated to provide those who wish to get involved in alcohol production on a large scale to be able to borrow these sums of money and at as low interest rate as possible. In order for this to happen it looks to me like a loan guarantee of some nature would also need to be implemented. If this was possible, I know that large scale production of alcohol could be started.

I feel the 4¢ Federal tax exemption and our State sales tax exemption is going to help promote the use of alcohol, but, I do not feel this exemption can or should be left on for a very long time. This exemption will not be necessary when the opportunity of alcohol from cellulose and larger demands for its use come about.

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Mr. ROSE. Thank you very much, Mr. Kelley. We will have questions for you from members of the committee at this time. Mr. Fithian.

Mr. FITHIAN. Thank you, Mr. Chairman.

First, let me thank Mr. Kelley for his testimony. I want to underscore what Mr. Kelley has indicated on page 1 of his prepared testimony. I have the feeling that by and large when people do the computation of economics on gasohol, particularly the cellulosic hydrolysis process which will be testified about tomorrow by the founder of the program, that they do tend to overlook the additional facet which is the impact on the imbalance of trade that we are now in.

I would also like to point out, Mr. Chairman, that the Farm Bureau Co-op. in our State of Indiana was the first and is the principal distributor of gasohol.

Let me congratulate the gentleman for that.

Mr. ROSE. Mr. Kelly.

Mr. KELLY. In your statement you indicated that we should not use corn as a major ingredient for alcohol production. Did you mean to say that we should not use corn?

Mr. KELLEY. We should not use corn necessarily 100 percent. The economics of alcohol talks about $2 corn. The farmer just cannot live with $2 corn.

If through set-aside programs or something of that nature we could get corn which is surplus and which could not be used any other way, then I think corn would be a viable product to use. It is an easy product to use. However, the farmer just cannot live with $2 corn. He will have to use something different from that.

Mr. KELLY. You mentioned a company in your statement. What company is that?

Mr. KELLEY. The company I represent? I am a part of the cooperative system. I am general manager of a county cooperative. The county cooperatives of Indiana bound together own the State Association which is a State cooperative, the Indiana Farm Bureau Co-op. Association, of which they have oil wells in the Illinois basin. They also have an oil well off the shore of Ghana. They are quite involved in petroleum production.

We still find our farmers being in the squeeze. I think that we would feel more comfortable producing not only food for export—which we also do—but also for fuel or energy production.

Mr. KELLY. Then you are a farmers co-op engaged in the petroleum business?

Mr. KELLEY. Yes, among other things.

Mr. KELLY. I want to thank you.

Mr. ROSE. Thank you. Are there any other questions by members of the subcommittees?

Mr. Kelley, we appreciate your excellent statement. It has been a pleasure to have you. Thank you very much. We will excuse you now.

We now call Mr. Warren W. Lamm, executive director, House Committee on Agriculture from the State of Pennsylvania.

Mr. Lamm, you may proceed.

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STATEMENT OF WARREN W. LAMM, EXECUTIVE DIRECTOR, COMMITTEE ON AGRICULTURE AND RURAL AFFAIRS, PENNSYLVANIA HOUSE OF REPRESENTATIVES

Mr. LAMM. Thank you, Mr. Chairman.

My name is Warren Lamm. I am the executive director for the Committee on Agriculture and Rural Affairs, Pennsylvania House of Representatives.

I appreciate the opportunity to appear before you in support of the National Alcohol Fuel and Farm Commodity Act of 1979.

There are numerous closely related issues which could be addressed in considerable detail. However, I am sure much other testimony has been and will be presented along similar lines, so I will try to express what I consider the concerns and potential as it applies to the Middle Atlantic and Northeast region of the United States.

I know that we are in a deficit position as far as grain production is concerned due to the concentration of dairy, livestock, and poultry enterprises so it is not practical for us to consider alcohol production from grain.

What we do have is the potential for other agricultural products such as sugar beets, potatoes, sweet sorghum, and varying quantities of substandard grains which are unfit for their normal use.

In addition, we also have considerable quantities of byproducts from food processing operations such as potato chip plants which result in culls and peels on a year-round basis. We also have considerable amounts of whey from cheese plants which is a very efficient commodity in the production of alcohol fuel.

While each one of these products in itself at any one particular location is rather small as compared to Iowa's corn production, when combined they can have a decided influence on alleviating some of the critical fuel energy problems presently facing all of us.

At this point, I believe that a great deal of research has been done in the general area of fuel production from agricultural products. This research should be consolidated, using the most current facts available. Some of the information now being circulated is rather obsolete and does not present a true picture of a modern efficient operation.

I believe the U.S. Department of Agriculture should assume the responsibility of making this information available to anyone seriously interested in the production of fuel alcohol from agricultural products.

We should be able to benefit from the experience of others, even though we may at times consider them less developed countries. Brazil, for example, has set for itself a rather ambitious goal, and I believe is determined to succeed in achieving it. For the coming fiscal year the cost of their petroleum imports will equal 48 percent of the value of all their exports, so they do have a serious problem. By 1985 they plan to reduce oil consumption by 50 percent.

With the wide range of resources available to us, we should establish our own goals to diminish our dependence on oil imports. This should have several very positive factors for us.

First, it would utilize resources which presently are considered to be either surplus commodities or waste products. It would provide a continuing market for the productive capabilities of American

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agriculture which are not fully utilized at present. Much of the residue from the alcohol fuel production is of considerable value for our livestock industry, so there would be little waste material. Production of alcohol fuel would also create a market for agricultural commodities where the capability for production exists but no market at present. A good example of such a crop for the Northeast is sugar beets. This would have the fringe benefit of increased agricultural income and provide employment.

A serious commitment to alcohol fuel production should help stabilize our motor fuel prices and send a strong signal to those supplying our oil imports that we are not totally at their mercy. The evidence presently available points to environmental benefits from the use of gasohol, an increase in miles per gallon and improved engine performance.

With the many positive factors favoring alcohol fuel production, the early enactment of the National Alcohol Fuel and Farm Commodity Act of 1979 will benefit all Americans.

Thank you for the privilege of appearing before you.

Mr. ROSE. Thank you very much, Mr. Lamm.

Are there questions from members of the subcommittees? Mr. Bedell.

Mr. BEDELL. Mr. Chairman, I want to commend the gentleman for his testimony. I appreciate his bringing out the fact that there are many, many products from which we could produce alcohol.

I presume you are aware of the fact that we are at this time in a program where we pay farmers to set land aside and to not grow grain, feed grains, at this time because of a surplus that we have. Are you aware of that, Mr. Lamm?

Mr. LAMM. Yes, I am aware of that.

Mr. ROSE. Mr. Jeffords.

Mr. JEFFORDS. You mentioned whey. Can you tell me what the status is of any projects which demonstrate the feasibility of whey being converted into alcohol and where they are located?

Mr. LAMM. I have been in touch within the last month with one operation in Wisconsin. I have also been in touch with the manufacturer of an alcohol distillation unit which last fall put a rather large plant into operation in Ireland.

This was for the production of alcohol.

It is less costly, judging from the facts that have been given to me compared with conversion of grain starch into sugar and then into alcohol. The whey itself already has the sugar in the form of lactose.

Mr. JEFFORDS. I appreciated that comment. As you well know, we have a tremendous oversupply of whey and the market is depressed. The whey plants are having difficulty getting by economically. That is the case in my State. Any additional market we could find would be very helpful.

Thank you.

Mr. LAMM. Yes, I thought this would be of specific interest to the general northeastern area. Much of the agricultural income is from the dairy industry there.

Mr. JEFFORDS. Thank you very much.

Mr. ROSE. Mr. Lamm, any information that you have about those processing units that you would share with the committees would

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be appreciated. We would like to have them. If you would send them to my attention, I would appreciate it.

Mr. LAMM. I would be pleased to get a copy to you.

Mr. ROSE. That will be fine.

Without objection, the record will remain open at this point for the purpose of inserting this additional material.

[Material to be supplied follows:]

The conversion of the whey to alcohol is based on the amount of lactose contained in the whey. The yield of alcohol will amount to one half of the lactose by waste. For example, if 100 pounds of whey contains ten pounds of lactose the yield of alcohol will equal five pounds. Anyone considering going into alcohol production from whey should first of all have accurate laboratory tests taken on the lactose content to determine whether it is economically feasible.

This conversion of lactose to alcohol is one of the more energy efficient types of alcohol production.

Mr. ROSE. Mr. Kelly.

Mr. KELLY. Based on your statement, Mr. Lamm, is your primary concern to solve the energy problems for the United States or through a more complete or total utilization of farm products to increase the farm income?

Mr. LAMM. I think it is rather difficult to separate the two. By utilization of either excess production or what are presently waste products, we can generate additional income for farmers and at the same time not totally solve but assist in solving the energy situation.

Mr. KELLY. Sugar is a super source of alcohol, isn't it?

Mr. LAMM. Right.

Mr. KELLY. If we were just trying to solve the energy problem, I wonder if it would not be just a good thing to let sugar come in at the world price and we make alcohol out of that. We can buy that at less than 50 percent of the cost of domestic sugar production. Would that not be a better way to solve the nation's energy problem?

Mr. LAMM. I am not an expert in that particular area. This would require, of course, a study of economics. I would not be prepared to make a statement on that.

Mr. KELLY. Thank you very much.

Mr. ROSE. Are there any other questions?

If not, Mr. Lamm, we want to thank you very much for your testimony. That was helpful.

Mr. LAMM. Thank you.

Mr. ROSE. Our next group of witnesses is a panel. We have Dr. Paul Middaugh, University of South Dakota; Mr. Richard Blaser, International Biomass Institute; and Mr. Lance Crombie from Webster, Minn.

Mr. Bedell.

Mr. BEDELL. Mr. Chairman, I want to see if Weldon Barton is in the audience. He was here this morning.

I wish the record would show that Mr. Barton is not here. I asked when the Department was here if they would have somebody here to be sure they would monitor the hearings.

Mr. BROWN. I am here from the Department, Mr. Bedell. I am Harry Brown.

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Mr. DASCHLE. For the record, I would like to clarify that Dr. Middaugh is from South Dakota State University rather than the University of South Dakota.

Mr. ROSE. We are glad to have all of you.

Dr. Middaugh, you may proceed.

STATEMENT OF PAUL MIDDAUGH, PROFESSOR OF MICROBIOLOGY, SOUTH DAKOTA STATE UNIVERSITY, BROOKINGS, S. DAK.

Mr. MIDDAUGH. I want to submit my prepared statement later and I want to summarize a few remarks.

I am Dr. Paul Middaugh, professor of microbiology at South Dakota State University at Brookings, S. Dak. Primarily I am a project leader for a South Dakota cooperative organic fuels product which is located on the campus.

This is entirely funded by citizens' contributions from South Dakota farmers and small community people. However, they are organized as the South Dakota East River Electric Cooperative, Inc., of Madison, S. Dak.

I have a single small grant from the National Rural Electric Cooperative Association of Washington, D.C.

Since I would like to testify on some of the industrial and economic phases of distillation, and so I would like to establish my background for the committees.

I have had 33 years of industrial fermentation experiment experience including that of Branch Chief, Pilot Plants Division, U.S. Army, Frederick, Md., for 9 years. I was director of the pilot plant of Grain Processing, Inc., of Muscatine, Iowa. Many of you know that this is a major producer of beverage and industrial alcohol by fermentation.

I am currently serving also as chairman of the Alcohol Fuels Subsection for the U.S. Department of Energy and the U.S. Department of Agriculture's workshop called the Mid-American Biomass Energy Workshop which is a fact finding and a review of obstacles and how to overcome them which is being sponsored May 21 to May 23 at Purdue University.

As project leader of the South Dakota Organic Fuels Project, I am doing pilot plant scale studies on the conversion of cellulosic properties such as corn stalks, wheat straw, barley straw, and other cereal straws, sawdust, beet pulp, and items such as grain dust from various elevators.

A second major project which is required in order to develop alcohol capability from the cellulosic materials is the development of a suitable small-scale distillation plant for the utilization of damaged or distressed cereal grains, potatoes, sugarcane, and starch materials.

I gave a presentation at a workshop sponsored by Congressman Tom Harkin of Iowa at Guthrie, Iowa, recently. It was on the farm production of alcohol fuels.

I was asked by a Department of Energy representative, Mr. William Holmberg, who works with the Department of Public Participation to bring an alcohol distillation unit to the fair at Washington, D.C. This I did. In 3 weeks my students and I created a new column duplicating one which is built into my experimental pilot

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plant and transported it to Washington, D.C., and ran it successfully to demonstrate the production of grain alcohol in an open field near the Lincoln Memorial.

We produced alcohol at the designed rate of 190 proof or 95 percent at a minimum rate of 25 gallons per hour. This is a little better than 500 gallons a day. This unit we have found is energy efficient with a ratio of energy input to output of better than a favorable balance of 2 to 1.

We are still determining with precision steam rotometers the exact input and output of that plant.

The fact that we could take in 3 weeks leadtime and create a plant for farm-scale or community-scale production of alcohol speaks well in contrast to the leadtime of from 1 to 2 years for a large alcohol production plant.

This material that we produced was placed at the display—the ACT 79—which is the Alternate Community Technology Fair, in Mr. Richard Blaser's engines. Initially we produced only 120-proof alcohol and that is only 60-percent alcohol and 40 percent water. Mr. Blaser was still able to create electric power from that low a water content-alcohol content with no gasoline.

It was then scaled up to 190-proof with very effective results. We will leave Mr. Blaser to comment on that.

The response to this and the response on the current energy shortage on the farms and the diesel fuel projected shortages when the farmers were still not in the fields because of the wet and cold weather, has been a tremendous outpouring of interest.

Following 10 workshops that I have taken part in around the country—mostly in the Midwest, including a recent one sponsored by WIFE, the Women Involved in Farm Economics at Dothan, Ga.—it seems that the entire country is ready to move at the farm level. They are not waiting for any government action.

As a response to this a Kansas farm group has organized as a nonprofit farm energy group. They organized on May 5 and they call themselves the Renewable Ag Fuels, Inc. which has no affiliation with any known farm group. It is entirely a spontaneous filling of their own need. They are determined to produce alcohol units, similar to the one that I demonstrated at Washington, D.C., in a factory in Colby, Kans. They are meeting on May 19. I understand there are busloads of farm people and community people coming from all over the country in response to national publicity in some of the farm magazines. We expect to have a tremendous outpouring of interest, and I think you would be well to watch this at the grassroots level.

One of the things about this is the energy balance. I need to address for just a moment this matter of controversy over the 50-year-old data base.

For example, the most recent distilleries that I am aware of—and since I worked as a professional pilot plant director for a grain processing corporation on major alcohol distillation units—I say that Midwest Solvents is one of the newest plants and it shows by its own records that it is about 37 years old. They are still using, I believe—and I cannot prove it—the basic beverage alcohol process. Of necessity it demands high purification of the alcohol. It is chemically pure whereas fuel alcohol can be cloudy and contain all

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the heads and ketones and all the other impurities that still burn very well in an automobile and other engines.

As a result, the beverage alcohol demand for something like 140,000 Btu's with a yield of about 85,000 Btu's per gallon of absolute alcohol is negative, as we all know.

However, my small-scale plant plus the industrial plants from at least four companies which are commercially producing or at least have built 35 distilleries throughout the world—each company has produced this number, that is—the data base then is wrong when you apply to fuel grade alcohol.

We are talking about an average of 40,000 Btu's. I recognize the term is invalid in terms of work as Mr. Daschle indicated earlier today.

On that basis of comparison we do have a positive energy balance and therefore a positive cost balance. However, our small-scale unit is able to utilize distressed or damaged grains. We can take the potatoes that are being plowed in. We can take the sugar beet residue.

We can take many things that are not available to a large plant that must contract three years in advance for its feed material. We don't have the disposal problem for the very simple reason that the grains are not to be dried and this is a savings. They are fed as a moist cake. Some new developments in this area, for example, a membrane concentration program by Dr. Harry Gregor of Columbia University. He tells me that he can concentrate the mash from this process through a simple membrane filtration step to about 35 or 40 percent solids. Then as the grain processing does for feeds in Iowa, you can blend that with a suitable dried grain and other additives and make a superior animal feed.

I am very concerned that the small-scale unit has not been given the credit or the interest that it should be getting.

However, there is room for an elevator scale, or middle-size scale unit. For example, I have been testing the elevator dust which is removed by OSHA and insurance requirements.I find that I can turn both the cellulosic material and the starchy material into alcohol by a suitable combination of enzymes.

The large-scale plants at the present time need additional funding. I know of three or four. They are all designed and ready to go but there is no loan guarantee and therefore the plants are not being built. The interest is high in all of these plants.

One of the biggest obstacles to the use of gasohol in this country has been the high cost of transporting the alcohol for gasohol from plant in Illinois.

When you get to 14 to 17 cents, or even 20 cents a gallon transportation cost, then we are in real trouble in terms of economics for gasohol.

In summary, I would like to say that for small-scale plants, we have designed and demonstrated an effective unit. The farm movement has incorporated in Kansas and it is spreading to other States rapidly.

A nonprofit farm energy cooperative which is going to build their own plants has been formed and they are not waiting for any government funding. They have told me repeatedly that all they want to do is have the government get out of the way.

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I have one other word which is needed here. Although the alcohol tax, the ATF, the Alcohol Tobacco, and Firearms personnel, have been very cooperative with me in all of my work, they still have to meet the rules. So, we are developing an in-line denaturing so that the farm-scale unit will be automatically denatures as the material comes off the still. They do need a change in the legislation because the current Formula 19 denaturant is excessive in cost. It costs about $20 to denature 100 gallons of alcohol using the denaturant.

We are asking why simple nonleaded gasoline cannot be substituted as a denaturing for automotive and other engine fuels.

There is one other area that I will comment on in closing. The Natick Laboratory in Natick, Mass., has pioneered much work in cellulosic digestion. They have helped me in every way they can with my cellulosic process on crop residues. I feel they need additional support and funding to make this conversion of 18 million tons of newspaper a viable process. They already can take one ton of newspaper and make 68 gallons of anhydrous alcohol.

When we think of our landfills going up, that is something to think about.

The final support that is needed is this. Dr. Dwight Miller and others are working at the Northern Utilization Research and Development Laboratory at Peoria, Ill. They are the world's experts and they need funding. They are the experts on industrial fermentation. We need to do high temperature yeast. We need new technology in terms of recycling and vacuum distillation of the vats as we make it. It has been predicted from some work published by Dr. Charles Wilke of Berkley and others that the rate of fermentation can be increased by twentyfold and the percentage of alcohol yield can be increased by at least 4 to 6 percent.

These are things which should be done and can be done best through the Northern Utilization and Development Laboratory at Peoria, Ill.

I thank you.

Mr. ROSE. Thank you. Did you say you were paying $20 for 100 gallons for the denaturing?

Mr. MIDDAUGH. That is correct. I pay $23.50 for 5 gallons of the ketone.

Mr. ROSE. Who requires that?

Mr. MIDDAUGH. It is required to denature the alcohol.

Mr. ROSE. By whom?

Mr. MIDDAUGH. The Federal Government. The Alcohol, Tobacco, and Firearms agency requires the denaturing. The complete denaturant available is called Formula 19.

Mr. ROSE. Do you mean we have not been able to get any change in the regulation to allow that to take place when it is in put in alcohol?

Mr. MIDDAUGH. They have to follow the rules.

Mr. BEDELL. That is the advantage of these hearings. I don't think we were fully aware of this problem. They have started the on-farm facility moving in the last few weeks. I assume these committees would like to see that changed.

Mr. ROSE. Thank you very much.

[The prepared statement of Mr. Middaugh follows:]

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Prepared Statement of Paul R. Middaugh, South Dakota State University

I AM PAUL R. MIDDAUGH, PROFESSOR AT SOUTH DAKOTA STATE UNIVERSITY, BROOKINGS,S.D. AND PROJECT LEADER, SOUTH DAKOTA COOPERATIVE ORGANIC FUELS PROJECT, A COOPERATIVE PILOT PLANT STUDY TO DEVELOP ALCOHOL FUELS FROM CELLULOSIC CROP MATERIALS AND FROM DAMAGED OR UNDERGRADE GRAINS AND OTHER STARCHY AGRICULTURAL PRODUCTS.

I HAVE HAD THIRTY THREE YEARS OF EXPERIENCE IN INDUSTRIAL FERMENTATIONS AND MOST RECENTLY SERVED AS DIRECTOR, PILOT PLANT, GRAIN PROCESSING CORPORATION, MUSCATINE, IOWA WHERE I SPECIALIZED IN ENZYMATIC CONVERSION OF STARCHES TO SUGARS AND SYRUPS.

I RECENTLY DEMONSTRATED A PORTABLE, SKID MOUNTED ALCOHOL FUEL PLANT ON THE FIELD NEAR THE LINCOLN MEMORIAL AS PART OF THE U.S. DEPARTMENT OF ENERGY AND INTERNATIONAL BIOMASS INCORPORATED ALTERNATE COMMUNITY TECHNOLOGY FAIR (ACT 79).

THIS PORTABLE FUEL ALCOHOL PLANT PRODUCED ALCOHOL OF 95 PERCENT PURITY OR 190 PROOF AT THE RATE OF 22 GALLONS PER HOUR USING FERMENTED CORN AS THE ALCOHOL SOURCE.

THIS PORTABLE SMALL SCALE FUEL ALCOHOL PLANT WAS CONSTRUCTED IN THREE WEEKS BY MY STUDENT, DENNIS VANDERGRIEND WITH TWO HELPERS AND BROUGHT BY THEM TO WASHINGTON, D.C. FOR THE APRIL 27-30 DEMONSTRATION.

THE 95 PERCENT ALCOHOL WAS USED TO GENERATE ELECTRIC POWER IN A MULTIFUEL ENGINE DEVELOPED BY RICHARD BLASER AS THE NAVAL ACADEMY HEAT BALANCED ENGINE OR NAHBE III. NO GASOLINE WAS NEED FOR THIS DEMONSTRATION ALTHOUGH THE BLASER ENGINE CAN RUN ALSO ON NON LEADED GASOLINE. THIS SMALL SCALE FUEL ALCOHOL PLANT WAS BUILT WITH FUNDS DONATED WITHIN THE SOUTH DAKOTA EAST RIVER POWER COOPERATIVES, INC. OF MADISON,S.D. ENTIRELY WITH SMALL DONATIONS FROM THE CITIZENS OF SOUTH DAKOTA AND A SINGLE, NON-GOVERNMENT GRANT OF $ 10,000 PROVIDED BY THE NATIONAL RURAL ELECTRIC COOPERATIVES ASSOCIATION, WASHINGTON, D.C. A TOTAL OF $ 25,000 WAS USED TO CONDUCT RESEARCH AND DEVELOPMENT ON PRODUCTION OF CELLULOSIC ENZYMES TO DIGEST CELLULOSIC CROP RESIDUES TO GLUCOSE SO THAT YEAST COULD PRODUCE FUEL GRADE ALCOHOL. THE DISTILLATION UNIT WAS DEVELOPED AT SOUTH DAKOTA STATE UNIVERSITY FOR SMALL SCALE FUEL ALCOHOL PRODUCTION.

A GROUP OF FARMERS IN KANSAS HAVE INCORPORATED A NOT FOR PROFIT RENEWABLE AG ENERGY, CORP. TO AID A MANUFACTURER IN COLBY, KANSAS TO START PRODUCING THE SMALL SCALE ALCOHOL FUELS DISTILLATION UNITS AS PART OF AN ALCOHOL FUELS PRODUCTION SYSTEM. SEVERAL FARMERS ARE USING THE 190 PROOF FUEL ALCOHOL AND EVEN 160 PROOF ALCOHOL

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TO OPERATE A DIESEL ENGINE BY ADDING A GASOLINE ENGINE CARBURATOR BY FARMER MODIFICATION. FUEL ALCOHOL IS SUPPLIED BY A SEPARATE TANK TO THE CARBURATOR AND THE DIESEL ENGINE AIR ASPIRATION DRAWS THE VAPORIZED ALCOHOL FUEL INTO THE CYLINDERS WHERE DIESEL FUEL IS INJECTED TO IGNITE THE FUEL MIXTURE. THE DIESEL FUEL INJECTORS ARE ADJUSTED TO ADD 50 PERCENT OF NORMAL DIESEL FUEL SO THE ALCOHOL SUPPLIES THE OTHER 50 PERCENT OF THE FUEL. THIS 50 PERCENT SAVINGS OF DIESEL FUEL CAN BE SIGNIFICANT WHEN DIESEL FUEL SUPPLIES ARE LIMITED DURING PLANTS OF CROPS, CULTIVATION AND HARVEST. THE USE OF ALCOHOL FUEL FOR IRRIGATION ENGINES IS ALSO POSSIBLE.

I SUPPORT THE CONCEPT THAT LARGE ALCOHOL FUEL PRODUCTION TO MANUFACTURE 200 PROOF FUEL ALCOHOL FOR USE AS 10 PERCENT MIXTURES WITH NONLEADED GASOLINE AS "GASOHOL" IS NEEDED FOR CITY AND RURAL AUTOMOBILES BUT FARM AND COMMUNITY SCALE PRODUCTION OF 190 PROOF FUEL ALCOHOL SHOULD ALSO RECEIVE THE BENEFITS OF GUARANTEED LOANS FOR PLANT CONSTRUCTION AND FOR PURCHASE OF GRAINS FOR FUEL ALCOHOL PRODUCTION UNDER THE PROVIDSIONS OF THE NATIONAL FUELS AND FARM COMMODITY PRODUCTION ACT OF 1979.

I SUPPORT THE GENERAL PROVISIONS OF THIS BILL WITH THE ADDITION OF THE BROADENING OF THE BENEFITS FOR THE SMALL SCALE FUEL PRODUCTION OF ALCOHOL WITH LESS THAN 300,000 GALLONS OF ALCOHOL FUEL PER YEAR. I RECOGNIZE THAT THIS FUEL ALCOHOL IS NOT WATER FREE AND CONTAINS FROM 4 to 5 PERCENT WATER. FARMERS CAN ADAPT THEIR ENGINES TO USE FARM AND COMMUNITY PRODUCED ALCOHOL FUEL MADE FROM DAMAGED, MOLDY GRAINS, CULL POTATOES AND SIMILAR UNMARKETABLE OR LOW VALUE STARCH CONTAINING AGRICULTUREL CROPS.

I WISH TO TESTIFY ALSO THAT MUCH OF THE ENERGY BALANCE AND COST DATA IS BASED UPON AN OLD INDUSTRY, THE BEVERAGE ALCOHOL INDUSTRY WHICH MUST MAKE A CHEMICALLY PURE, TASTELESS BEVERAGE ALCOHOL AT A COST OF ABOUT 140,000 B.T.U. PER GALLON. THE ALCOHOL IF BURNED YIELDS ABOUT 85,000 B.T.U. PER GALLON. IN CONTRAST, NEW FUEL ALCOHOL PROCESSES AVAILABLE FROM AT LEAST FOUR ENGINEERING FIRMS REQUIRES ONLY 40,000 B.T.U PER GALLON OF FUEL GRADE ALCOHOL. OUR SMALL SCALE FUEL ALCOHOL PLANT ALSO REQUIRES LESS THAN 40,000 B.T.U. PER GALLON. THE ENERGY BALANCE OF FUEL ALCOHOL IS POSITIVE BY 2 TO 1 AND HAS A POSITIVE COST OF PRODUCTION IF THE 18.5 POUNDS OF HIGH PROTEIN, 30 PERCENT, IS CREDITED, AS A FEED ADDITIVE.

SMALL SCALE FUEL ALCOHOL PRODUCTION IS EXPECTED TO GROW RAPIDLY.

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Mr. ROSE. Our next witness is Mr. Richard Blaser.
Mr. Blaser, please proceed.

STATEMENT OF RICHARD F. BLASER, DIRECTOR, BIOMASS FUELS TASK FORCE, INTERNATIONAL BIOMASS INSTITUTE, WASHINGTON, D.C.

Mr. BLASER. Thank you, Mr. Chairman.

I am Richard Blaser. I have a written statement which I will submit for inclusion in the record.

Mr. ROSE. That will be fine.

Without objection, your entire prepared statement will be inserted in the record.

Mr. BLASER. My position is totally the reverse of the normal audience here. I am a scientist, and I apply science. I hold engineering diplomas from Argentina in 1944. I came back to the univerity and I hold a masters degree which I earned in 1974.

I am fascinated by energy and I am fascinated by how we follow through. In 1970 I started working in engines. Engines were my basic occupation because I am a pilot.

I was astonished about the covered up solution in terms of the ignorance in this answer to pollution and efficiency. I have come back advocating that the solution for engines is in the theory which is more than 100 years old. This is completely ignored that in 1907 when the act for denaturing alcohol was passed that it was 20 years after Germany did it.

The expection of the farmer and the industry in the United States was the same that I hear today. This happened 7 years ago. The expectation remains.

During this work I have modified the technology. I redid the energy cycles. I created a theoretical cycle which is not thermodynamic. That is an absolute science in which we need results for the common people.

The result of the theory is an engine which runs with any fuel from diesel fuel to alcohol fuel. Fuels are carbon and hydrogen. Any molecular that has densified by a mass in formal carbon and hydrogen forms and change can react fast and produce a conversion of chemical energy into thermal energy which after will be transformed in torque. This is the function of the engines.

For that I will refer to biofuels or alcohol-based fuels. After it has been proven that alcohol is a fuel, then we have rediscovered the wheel because alcohol as a fuel is now better than gasoline. In 1907 it replaced alcohol in engines because it was cheaper.

Today we are in the same process. We have the price of alcohol. Alcohol is a pure fuel. It is a better fuel than gasoline. Gasoline is a complicated mix of hydrocarbons. Gasohol is pure. Alcohol is pure.

So what happened? No technology has been developed to help this division of more than 50 years. Also, the engines have been optimized for fuels, that is, fossil fuels for their normal operation.

Today let's compare the alcohol which is undeveloped with a very high formulated gasoline. On the other side, we want him to perform better or equally in an engine that was developed for gasoline.

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As a scientific man, I am responsible for this opinion. I took all of the facts of my presentation. This is not as my opinion. They are in books and in reports of the Government of the United States.

We know that alcohol can be mixed and can be used alone and can be used for any capability of the fossil fuels.

Why do we use miles and miles of paper telling that alcohol increases the octane rate? Why do we have a lot of paper saying this about the water separation? That is chemistry and physics. We have a precious technology that we need to use.

I wanted to say that. I have come back to the book. I admire the technology that we have. I am astonished about the inefficiency in this area. The university is not applying science.

There is a timid position of the Government bureaucrats. This makes the positions and the facts tarnished by opinions.

I feel that these committees and the subject here is indicating a new era. We need to use all of our resources of energy and use these with wisdom. They should be used for the betterment of life because life is energy.

We need to bring science into produce a renaissance of life and to produce things for the common people. We need to solve the problems in this atmosphere and recognize that anything that we would do in the future will be the product of cooperative effort of teamwork and science, business, and government.

Also, I found a great audience among the farmers. That is my testimony.

The farmers can do anything. They can produce energy. They don't produce food. The biomass is a barrel of energy of which we only take a very little bit to egotistically take care of the big towns.

We need to come back to the barrel of energy.

I have my technical questions in my prepared testimony. My documents are official.

Mr. ROSE. Mr. Blaser, we thank you for your testimony.

[The prepared statement of Mr. Blaser follows:]

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Prepared Statement of Richard F. Blaser, International Biomass Institute

MR. CHAIRMAN:

I AM RICHARD F. BLASER, TESTIFYING AS A MEMBER OF THE BOARD AND AS DIRECTOR OF THE BIOMASS FUELS TASK GROUP OF THE INTERNATIONAL BIOMASS INSTITUTE. THE INSTITUTE IS A NON-PROFIT ORGANIZATION DEDICATED TO COMMUNITY ENERGY SELF-SUFFICIENCY THROUGH THE PARTICIPATION OF INDIVIDUALS IN THE RESTORATION AND ENJOYMENT OF THE BIOMASS HARMONY.

I AM APPLYING ENGINEERING SCIENCE TO THE FORMULATION OF FUELS AND COMBUSTION ANALYSIS FOR INTERNAL COMBUSTION ENGINES. I HOLD AN ENGINEERING DEGREE FROM CORDOBA UNIVERSITY IN ARGENTINA. IN 1974 I WAS GRANTED THE MASTER OF SCIENCE DEGREE FROM THE UNIVERSITY OF MARYLAND AND HAVE ALMOST COMPLETED THE COURSE-WORK AND DISSERTATION REQUIRED FOR A PH.D. IN ENERGY FROM THE SAME UNIVERSITY.

SINCE 1970 I HAVE BEEN APPLYING MY PROFESSIONAL CAPABILITIES IN ADVOCATING THAT THE ANSWERS TO THE POLLUTION, EFFICIENCY, AND FUEL LIMITATIONS OF MODERN INTERNAL COMBUSTION ENGINES REST WITH THE COURAGEOUS AND CREATIVE USE OF SCIENCE AND TECHNOLOGY IN REFINING THE MORE THAN 100-YEAR OLD THEORETICAL ASSUMPTIONS OF ENGINE CYCLES AND THE FORCED COMPROMISES IN THEIR COMBUSTION OF FUELS. UNFORTUNATELY, THIS ADVOCACY HAS

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OFTEN COLLIDED WITH THE SOPHISTICATION OF THE SCIENTIFIC COMMUNITY AND GOVERNMENTAL COSMETIC APPROACHES WITH THEIR UNREALISTICAL AND COSTLY SOLUTIONS SUCH AS CATALYTIC CONVERTERS, COMPUTERIZED HARDWARE, SOPHISTICATED FUEL FORMULATION AND INJECTION, GEOMETRICAL CONSTRAINTS AND SO FORTH. THESE APPROACHES ARE HURTING THE ECONOMY, UNNECESSARILY DEPLETING ENERGY RESOURCES AND ARE DEGRADING THE OPERATIVE, MANUFACTURING, AND MAINTENANCE CAPABILITIES OF THESE ESSENTIAL INTERNAL COMBUSTION ENGINES.

I HAVE BEEN WORKING TO FIX THESE PROBLEMS, AND AFTER EIGHT YEARS OF DIGGING INTO SCIENTIFIC FACTS AND MODERN TECHNOLOGIES, MY WORK HAS RESULTED IN A NEW THEORETICAL ENERGY CYCLE FOR THESE ENGINES - THE BETA CYCLE.

THE BETA ENGINE WAS MOST RECENTLY SEEN OPERATING ON THE MALL DURING THE APPROPRIATE COMMUNITY TECHNOLOGY FAIR FROM APRIL 27 THROUGH THE 30TH. AT THIS, AND OTHER TIMES, GOVERNMENT OFFICIALS, INDUSTRY REPRESENTATIVES, SCIENTIFIC EXPERTS, FARMERS, AND THE GENERAL PUBLIC HAVE WITNESSED THE FUEL TOLERANCE AND GENERAL CAPABILITIES OF THESE ENGINES AS THEY OPERATED ON DIESEL FUEL, KEROSINE, GASOLINE, AND ALCOHOL WITHOUT OPERATIVE PENALTIES.

THE USE IN THE BETA ENGINES OF ON-SITE DISTILLED CORN ALCOHOL FROM 150 PROOF TO 190 PROOF AS WELL AS PRODUCERS GAS FROM WOOD HAVE PRACTICALLY PROVEN THAT WE HAVE THE TECHNOLOGY AND THE MEANS FOR PRODUCING AND USING BIOMASS FORMULATED FUEL. FURTHER,

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IT SHOWS THAT THE PRODUCTION OF THIS FUEL CAN BE CARRIED OUT WITH COMMUNITY SIZED OPERATIONS UTILIZING READILY AVAILABLE AND UNCOMPLICATED MANUFACTURING AND OPERATION TECHNOLOGY.

BUT, BEFORE BEGINNING TO DISCUSS THE EVALUATION OF THE STATE-OF-THE-ART OF THE ENGINE TECHNOLOGY AND THE EXPECTATIONS OF ITS APPLICATION, WE MUST ADDRESS THE REAL, COMMON PROBLEM OF TODAY: GOVERNMENT, SCIENCE, INDUSTRY, AND THE PEOPLE ARE CONFRONTED WITH A "BABEL" OF NON-UNDERSTANDABLE NOISE IN THE FORM OF OPINIONS AND ADVOCACYS THAT ARE LOUDLY AND BLINDLY CREATED BY THE ARROGANCE OF OLD LOSERS LOOKING FOR ANOTHER BANNER BY THE REDISCOVERERS OF BIOMASS CAPABILITIES, BY ENDANGERED INDUSTRY REPRESENTATIVES AND GOVERNMENT BUREAUCRATS, AND BY GREED-FED SCAVENGER ENTREPRENEURS. ALL OF THEM ARE EVALUATING AND DESCRIBING ALCOHOL AND REMINDS ONE OF THE WISE, BLIND MEN DESCRIBING AN ELEPHANT THROUGH THEIR SENSE OF TOUCH.

ALL OF MY TESTIMONY WILL REFER TO THE GROUND OF MY PROFESSIONAL CAPABILITIES. MY SCIENTIFIC ROOTS HAVE BEEN NURTURED IN PROPER TECHNOLOGIC FACTS WHICH HAVE IN TURN BEEN COLLABORATED IN RESEARCH REPORTS SPONSORED AND FUNDED BY GOVERNMENT, INDUSTRY, AND SCIENTIFIC INSTITUTIONS.

SOME OF THESE FACTS ARE AS FOLLOWS:

- AT THE BEGINNING OF THE CENTURY, GASOLINE, A BY-PRODUCT IN THE PRODUCTION OF KEROSINE, DISPLACED ALCOHOLS FUEL

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FOR INTERNAL COMBUSTION ENGINES ONLY BECAUSE IT WAS CHEAPER. FURTHERMORE, EDISON'S DISCOVERY OF THE ELECTRIC BULB MADE GASOLINE THE "HORSE" OF THE OIL INDUSTRY.

- FROM THEN TO TODAY, THE INTERNAL COMBUSTION ENGINE HAS BEEN OPTIMIZED FOR USING FOSSIL LIQUID FUEL. THE PRIMITIVE FORMS OF GASOLINE HAVE BEEN FORMULATED THROUGH REFINING. ITS BURNING BEHAVIOR HAS BEEN IMPROVED AND LITTLE OR NO CONSIDERATION HAS BEEN GIVEN TO OTHER SOURCES OF LIQUID AND GASEOUS FUELS SUCH AS THOSE DERIVED FROM BIOMASS.
- TODAY THE FEAR OF NON-SOLVABLE, POLLUTION, EFFICIENCY, AND SCARCITY PROBLEMS HAVE RETURNED OUR ATTENTION TO OTHER SOURCES OF FUEL.
- THE ESTABLISHED GROUND FOR EVALUATION OF ALCOHOL FUELS ARE BIASED AND UNFAIR WHEN ONE CONSIDERS THAT THE COMPARISONS ARE MADE BETWEEN HIGHLY REFINED AND FORMULATED GASOLINE TECHNOLOGIES AND THE RELATIVELY PRIMITIVE, NON-OPTIMIZED ALCOHOL FUEL TECHNOLOGIES WHICH HAVE BEEN DORMANT FOR NEARLY A HUNDRED YEARS. ONCE FORMULATION TECHNIQUES, ENGINES AND AUXILIARY HARDWARE HAVE BEEN OPTIMIZED FOR BIOMASS FUELS, THEY WILL STAND THE TEST.

REALITY WILL SUPPORT MY ANSWERS. THE STATE-OF-THE-ART AND MORAL TRUTH WILL BE USED IN EVALUATING THE POSSIBILITIES OF FORMULATED ALCOHOL BASED ENGINE FUELS AND IN IDENTIFYING THE ENGINES AND AUXILIARY HARDWARE NECESSARY FOR OPTIMIZING THEIR OPERATION. IN ADDITION, THE OPPORTUNITIES FOR ECONOMICS

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AND ENERGY BALANCE IN THEIR PRODUCTION WILL ADDRESS THE REAL AND LOGICAL DIFFERENCES BETWEEN ALCOHOL BASED FUELS AND 200 PROOF ALCOHOL.

CONCLUSIVELY, ALCOHOLS ARE SCIENTIFICALLY, ECONOMICALLY, AND OPERATIONALLY A BASE FOR FORMULATING LIQUID FUELS FOR INTERNAL COMBUSTION ENGINES AND THEIR CONTRIBUTION TO THE SUPPLY OF ENERGY NEEDS TO BE COUNTED.

FUELS BASED ON METHANOL, ETHANOL, AND SMALL AMOUNTS OF CERTAIN HIGHER ALCOHOLS, NEAT OR AS BLENDS WITH GASOLINE, ARE THE LIKELIEST CANDIDATES FOR THE REPLACEMENT OF PETROLEUM BASED FUELS. IF NOTHING ELSE, THEY WILL PLAY A KEY ROLE IN THE TRANSITION FROM PETROLEUM BASED FUELS TO POSSIBLE SYNTHETIC FUELS OF THE FUTURE.

DUE TO THEIR CURRENT RELATIVE AVAILABILITY AND THEIR DEVELOPING PODUCTION AND RESOURCE TECHNOLOGIES (COAL AND BIOMASS), ALCOHOL FUELS COULD PLAY A KEY ROLE IN REDUCING THE EFFECTS OF ANOTHER OIL EMBARGO SUCH AS THE ONE EXPERIENCED IN 1973-74.

SINCE THAT TIME, THE NEED TO CONSERVE PETROLEUM RESOURCES HAS BECOME PRONOUNCED AND THE WORK ON ALTERNATIVE FUELS HAS BECOME MORE INTENSE. BECAUSE OF THEIR POTENTIAL UTILITY AS A TRANSISTIONAL FUEL, ALCOHOL FUELS MAY BE CALLED UPON TO POWER A SUBSTANTIAL NUMBER OF VEHICLES CONFIGURED TO REFLECT TODAY'S INTERNAL COMBUSTION ENGINE TECHNOLOGY. IN SUCH A CONTEXT, THE FIRST REQUIREMENT IS FOR AN ACCEPTABLE FUEL AND ONLY AFTER THAT HAS BEEN ACCOMPLISHED DO WE CONCERN OURSELVES AS TO WHETHER

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IT IS A BETTER FUEL. EXISTING AND FUTURE REGULATORY STANDARDS FOR ENVIRONMENTAL ACCEPTABILITY AND ENERGY CONSERVATION MUST BE SATISFIED AND SO MUST COMMERCIAL AND PUBLIC STANDARDS OF HIGHWAY VEHICLE UTILITY, ECONOMY, AND PERFORMANCE.

RESEARCH OVER THE PAST SEVERAL YEARS IN THE UNITED STATES, EUROPE, AND SOUTH AMERICA HAS CONCENTRATED ON THE SOLUTION TO A NUMBER OF THE KEY PROBLEMS WHICH WERE EXPECTED TO SLOW DOWN THE PRACTICAL UTILIZATION OF METHANOL AND ETHANOL FUELS IN HIGHWAY TRANSPORTATION SYSTEMS. A LARGE AMOUNT OF NEW DATA HAS BEEN GENERATED, MUCH OF WHICH IS DISPERSED, VIRTUALLY WORLDWIDE, IN A LARGE NUMBER OF REFERENCES. THUS, IT IS APPROPRIATE TO SUPPLY A NON-BIASED RECOLLECTION OF THE FACTS WITH THE PURPOSE OF PROVIDING A PICTURE OF TECHNOLOGY READINESS IN ANTICIPATION OF FUTURE DEMAND WHICH IS ANTICIPATED BY THE FINDINGS OF OUR DATA ON THE OPERATIVE BEHAVIOR OF A FORD PINTO ENGINE COMPARATIVELY OPERATED ON GASOLINE (INDOLENE), METHANOL, AND ETHANOL. THE FOLLOWING FIGURES CONSOLIDATE THE RESULTS:

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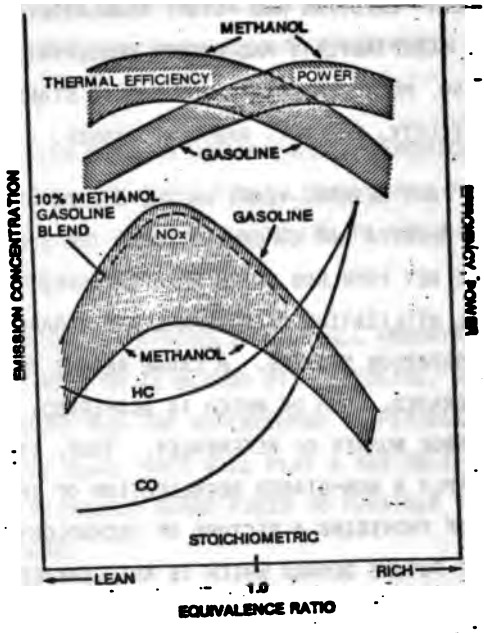
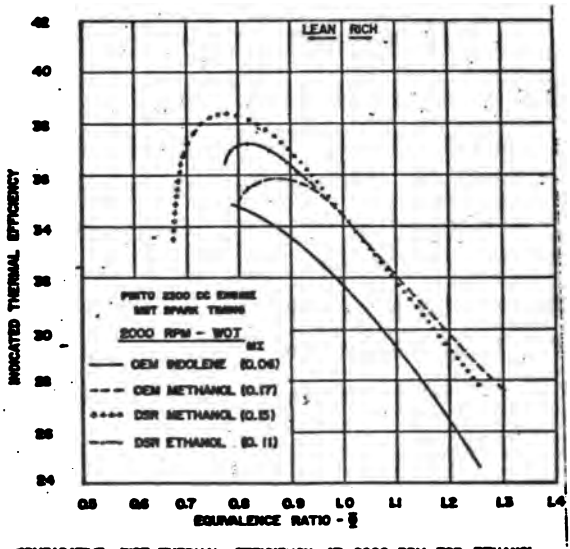


EFFECTS OF ALCOHOL FUELS ON ENGINE PERFORMANCE AND EMISSIONS



COMPARATIVE WOT THERMAL EFFICIENCY AT 2000 RPM FOR ETHANOL, METHANOL, AND GASOLINE

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CONCLUSION

THIS CONDENSED OVERVIEW OF FACTORS RELATING TO FORMULATED BIO-MOTOR-FUELS ACTUALIZES AND UPDATES THE CONCLUSION ESTABLISHED BY F.B. WRIGHT IN 1907.

WHEN OUR GOVERNMENT BECOMES AS FAR-SIGHTED AS ITS FARMERS, FORMULATED BIOFUELS WILL REACH THEIR FULL POTENTIAL IN THE NATION'S ENERGY MIX AND OFFER A BRIGHT, INDUSTRIALIZED FUTURE, A FUTURE BASED ON RENEWABLE ENERGY SYSTEMS PUT TO WORK TO THE BETTERMENT OF NATURE -- ALL OF NATURE INCLUDING US.

FINALLY,

ALCOHOLS ARE FUELS THAT CAN BE PRODUCED IN COMMUNITIES AND IN INDUSTRIAL LOCATIONS.

ALCOHOLS CAN BE USED AS A BASE FUEL OR TO IMPROVE FOSSIL FUELS.

ALCOHOLS NEED TO BE RELIEVED OF THE BURDEN PLACED ON THEM BY ARROGANT ADVOCATES OF FOSSIL FUELS AND BY TIMID GOVERNMENT BUREAUCRATS.

ALCOHOLS CAN BEST BE ADVANCED THROUGH A COOPERATIVE EFFORT BETWEEN FARMERS, SCIENTISTS, BUSINESSMEN AND GOVERNMENT WORKERS.

ALCOHOLS ARE SHOWING THE WAY FOR BIOFUELS.

(The attachment to Mr. Blaser's statement is held in the subcommittee file.)

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Mr. ROSE. We will now hear from Lance Crombie.

STATEMENT OF LANCE CROMBIE, WEBSTER, MINN.

Mr. CROMBIE. Thank you, Mr. Chairman.

I am Lance Crombie from Webster, Minn. I have a Ph. D. in microbiology and am a full-time farmer. I am a little anxious to get through with the hearings, I think, because I have to plant corn. It has been wet and we haven't got a kernel in the ground yet.

Very briefly, I got into alcohol by looking at my loss per bushel and corn sitting in storage, and I took some corn, fermented it, and distilled it. I made alcohol.

I proceeded to design and set up a solar still. I am looking and developing, and basically I am here to support the Bedell bill and the whole gasohol movement so that we can possibly look at some financing.

My total budget for the entire research and development program is $1,000. I spent the whole thing so basically I am doing very little right now.

However, I designed and built a solar still. I made some alcohol. I tested it in a home heating furnace, in a diesel tractor, and in a car.

Briefly, the very next day I got raided by the Alcohol, Tobacco, and Firearms people. I have had some very good conversations with them.

Since then I have an experimental permit under which I am operating. It is free. They are trying to require me to have a bond. There is no discussion about denaturing of alcohol. It is supposed to be denatured if you sell it, but if I use it myself, I apparently don't have to denature it.

I am here to try to convince everyone throughout the United States. I understand there are about 10,000 applications right now for experimental permits to set up their own stills and in due time, hopefully, if the bill passes, larger plants can be built and then smaller ones.

Briefly, let me describe how alcohol is made. I think everyone has talked in broad general terms. I am in favor of the small farm plant and a small system because the capital investment is low to begin with. I think we can try some new technologies. Dr. Middaugh has a certain design on a plant.

I have a way I want to go. I am looking for some funding or some source of loan or something. My $1,000 budget is gone.

If we simply look at making alcohol consisting of several basic steps, I think we will do something.

No. 1, take something that has carbohydrate or starch or cellulose or sugar material in it.

The second step is to convert that material into what we call a fermentable form. It order to do that with cellulose, you have to break it down by certain methods with enzymes and chemicals and whatever and get the free sugar.

For starch you have to break it down for free sugars. In sugars, like sugar beets and sugarcane, you simply add yeast in water at about a 10 percent sugar solution, 10, 12, or 14 percent sugar solution. The yeast ferment sugar. They give off carbon dioxide

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alcohol and there is a residue remaining. This is namely the yeast cells and other stuff that was not fermented.

Now you have to take the whole mess which consists of approximately 10 percent alcohol and distill it. There are several methods of distillation. The classical one that everyone knows about and talks about is a column and you pump steam and the mash or the beer into the column and the alcohol comes out of the top and the residue and water come out of the bottom.

Another method, and the thing I am working on, is solar distillation. There are other methods that use vacuum. There are other methods that use solvent extractions.

Dr. Middaugh mentioned the membrane technology.

There are all kinds of options. I strongly believe that the small-farm plant or the small-scale plant—almost a small pilot scale plant—could be tested very rapidly and get them out.

Some of the advantages for me then, of having a small plant is this. First of all I can control it. Second, I am the owner and operator. Third, I can have my wife run it or my kids run it. I do not have to hire help, so basically I have a bigger profit margin on my corn. Mine will come out ahead about $5 a bushel gross income from corn. It will run at about 4-to-1 net energy gain. I am looking at a continuous flow process.

I have about 32 cent-per-gallon-per-annum-per-year investment, and my cost of the alcohol will be about 34 cents a gallon of 200 proof.

It is not running. I have not done it yet. But, according to the engineers in the papers in the studies, it looks very good.

However, it is yet to be done. I have no transportation costs on the farm. I have low labor. I have the advantage of feeding the mash wet. I essentially have relatively low capital investment. I have grain storage tanks and fuel storage tanks in possession already. I usually have some sort of energy available if I want to burn residue like wood or some other thing, I could use that.

I do not have to pay a corporate president. I do not need any stockholders. I do not need a secretary, treasurer, engineer, salesman, or middle man, janitors, or anything else to make mine operate correctly. I don't have to worry about OSHA, the Department of Energy, politicians, environmental impact complications, EPA, or DNR. It is basically a small mechanical hog.

There are no offices needed, no legal fees, no boardroom, no boss, and no meetings.

I feel strongly that a small farm plant initially is the way to go. We need big ones, of course. We need other situations. We like to see cellulose come online. I think it is not quite ready yet.

The grain is here. Our friend, Mr. Barton, has said over and over again that alcohol is no good, and that if it is good, it should come from cellulose. I feel that Mr. Barton should not be around and that corn is better because of the fact that why should I grow corn to make corn stalks and sell the corn at a loss. That is what we are doing at the present time.

I feel you can describe farmers very simply in this way. We are the willing, and we are led by the unknowing, and we are doing the impossible for the ungrateful. We have done so much for so

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long with so little that we are now qualified to do anything with nothing.

Thank you.

Mr. ROSE. Thank you.

Dr. Middaugh, I am sure you have seen the Department of the Treasury's "Ethanol for Fuel Use" pamphlet.

Mr. MIDDAUGH. Yes, I have. That is formula 19. One gallon of gasoline unleaded or kerosene plus 4 gallons of ketone, which is the item that is expensive.

Mr. ROSE. Why don't you use formula 28–A?

Mr. MIDDAUGH. Because those are special formulations, I believe, and could not be used in the way we want to use fuel oil on an experimental basis for engines on a farm or premises.

Mr. ROSE. It says formula 28–A—to every 100 gallons of alcohol add 1 gallon of gasoline. Authorized uses—as a fuel.

Mr. CROMBIE. That is not the totally denatured fuel, Mr. Chairman.

Mr. MIDDAUGH. That is correct.

Mr. CROMBIE. It is called specially denatured.

Mr. MIDDAUGH. There are only two formulas that meet the requirements of the farm fuel scale. Those are the two listed as complete denaturation.

Mr. ROSE. I wish you would give us your comment on that as it relates to formula 13–A, 18–A, because that certainly is an area that we could get involved in to try to help you.

Mr. MIDDAUGH. These are special denaturants. If a person wants to make a special product like perfume, they need special denaturant to hold that alcohol on their premises. They are allowed to use special denaturants. But they cannot move it off the premise and they cannot sell it in that form.

Mr. ROSE. Are there any questions from members of the committees? Mr. Harkin.

Mr. HARKIN. Dr. Middaugh was at a conference I held in Iowa. You have been back.

Mr. MIDDAUGH. Yes, I have been back twice. We expected 70 people and we had somewhere between 400 and 500 at several of the meetings.

Mr. HARKIN. The meeting in the Guthrie Center was echoed throughout the district.

Mr. MIDDAUGH. That is why I am here.

Mr. HARKIN. Mr. Crombie, let me ask you a question. I am interested in what you had to say. It strikes me as some of the most important testimony today. This has to do with the size that we are talking about. I was reading through some of the other testimony here. Everyone I talked to about making gasohol talks about putting in the huge plants, like 20 million gallons a year or else they are not any good. It has to be huge.

I think you have brought up an interesting point. There is an economy of scale. They only look at certain factors. Dr. Middaugh talked about this when he was down in Iowa. He talked about a small plant.

Let me rephrase the question. People are talking about producing enough gasohol to make an impact on our total gasoline consumption. Look at it from a different angle. Building gasohol

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plants will save farmers money. It will save people in small towns money. Look at it from a different standpoint, and when you look at it from that standpoint then the smaller the plant using solar technology, using, as you say, low-cost labor—the people available—that may be the best way to go right now rather than thinking about huge plants that cost $100 million to make 20 million gallons a year, and that kind of thing.

Mr. CROMBIE. I feel strongly that way because it gives me the independence to try different things.

If you are going to have new technology come down the line then we ought to use it. We have just started. I think everyone will agree with this. There are a tremendous number of new things that are coming up. We have no research done in this area—the area of really looking at making alcohol cheap. I mean really cheap.

I have confidential disclosures to me from people that use systems that hook heat pumps up in certain ways that show about a 3,000-Btu-per-gallon production cost in energy. They are not happy with it. They want to get 100 percent energy back out plus a little bit more. I was called in to hook up a solar collector to help it even more.

We have not even started. But, if you take the old tin barrel and a rusty old piece of steel that is a still, then if a guy wants to go out and make a batch of alcohol and produce enough over a summer for a period of time for his own use, then he has really contributed to his own self-satisfaction and not necessarily to the overall picture of the world oil situation. But he has a technology that he can fall back on even though he may not use it all the time.

Mr. HARKIN. That is right.

That is where the Department of Agriculture is really missing the boat. They are looking at this in macro terms and talking about the huge impact on the amount of the oil that we import rather than looking at how they can help individual farmers and small town people to be self-sufficient and non-reliant on the imported oil.

Mr. CROMBIE. Decentralized energy production.

Mr. HARKIN. Dr. Middaugh, you were holding up a photograph——

Mr. BLASER. Excuse me. Let me make a point.

Two hundred proof alcohol is not 200 proof with the water separation. Alcohol that is 200 proof cannot be produced by distillation but only 190 proof can be done. From there if you want to go to 200 proof, then you need to go to a tertiary column which is a sophisticated process. That would require a big industry.

The gasohol then would be dominated by the big companies. I feel this is a good solution. We can import pure alcohol and teach the Africans to farm crops. They will make money.

But in the United States the freedom of the farmer has considered alcohol as a fuel. It is 190 and 180 proof. They have the choice. Now there is another market. They will decide if they sell the corn or if they make fuel for the next harvest.

If we go and support the full spectrum as we do the biofuels, then that should be the way to go.

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Mr. ROSE. Mr. Darold Albright is the next witness.

STATEMENT OF DAROLD E. ALBRIGHT, EXECUTIVE DIRECTOR, INTERNATIONAL BIOMASS INSTITUTE, WASHINGTON, D.C.

Mr. ALBRIGHT. Mr. Chairman, I do have a statement to submit along with some additional material.

Mr. ROSE. That will be fine.

Without objection, we will insert your entire prepared statement in the record.

[The prepared statement of Mr. Albright follows:]

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Testimony Before the Joint Hearing of the
Subcommittees on Department Investigations, Oversight, and Research;
Conservation and Credit; and Livestock and Grains;
of the House Agriculture Committee

By

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ALCOHOL FUELS ARE THE FOREBEARERS OF SEVERAL ENERGY ORIENTED ECONOMIC, POLITICAL, AND SOCIOLOGICAL CHANGES IN AMERICA. IT IS CRITICAL THAT WE DEAL WITH THESE FOREBEARERS WISELY, FOR THEY WILL HELP SET THE PACE AND TONE FOR OTHER EMERGING RENEWABLE ENERGY SYSTEMS THAT CAN BE DEVELOPED IN THE BEST INTEREST OF THE PUBLIC. IN THIS PRESENTATION, MY PRINCIPAL FOCUS IS ON ALCOHOL, BUT I HAVE ALSO REFERRED TO OTHER BIOMASS FUELS, SOLIDS, LIQUIDS, AND GASES, THAT CAN BE MADE THROUGH THE REFINING OF BIOMASS. GASOHOL, ALCOHOL AND BIOMASS FUELS ARE THE A, THE B, AND THE C THROUGH Z OF A POTENTIALLY MAJOR ENERGY SYSTEM THAT IS ABOUT TO DAWN.

ALCOHOL FUELS CAN:

- o REDUCE RELIANCE ON IMPORTED FOSSIL FUELS;
- o REINFORCE THE INTEGRITY AND ECONOMIC VIABILITY OF THE FAMILY FARM AND THE AMERICAN FARM COMMUNITY;
- o ENHANCE THE ENVIRONMENT, BUT ONLY IF ALCOHOL FUELS ARE PRODUCED, REFINED, STORED, AND COMBUSTED WISELY;

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- o ENSURE ADEQUATE ENERGY SUPPLIES FOR FARMING OPERATIONS, EVEN IN THE EVENT OF EXTREME FUEL SHORTAGES, OR NATURAL OR MAN-CAUSED DISASTERS.
- o DEMONSTRATE THE GREAT VALUE OF INDIVIDUAL CREATIVITY AND INNOVATION WHEN RECOGNIZED AND REINFORCED BY THE PRIMARY INSTITUTIONS OF OUR SOCIETY.

IN THE NEXT FEW MOMENTS, I WILL NOT ADDRESS ECONOMIC, ENERGY BALANCE, OCTANE BOOSTER, EMISSION LEVEL, OR FOOD VERSUS ENERGY ISSUES BUT RATHER, WILL FOCUS ON TWO CRITICAL QUESTIONS --WHAT INSTITUTIONS WILL CONTROL ALCOHOL FUELS, AND WHO WILL ENSURE ADEQUATE PROTECTION OF THE ENVIRONMENT?

THE MAJOR INSTITUTIONS, SUCH AS THE GOVERNMENT, THE OIL INDUSTRY, THE COMMODITY MARKETS AND THE DISTILLERS ARE MOVING TO DOMINATE ALCOHOL FUELS, ARGUING THAT ONLY THEY HAVE THE SCIENTIFIC, TECHNICAL, ENGINEERING, MARKETING, AND MANAGERIAL EXPERTISE NECESSARY--AND, OF COURSE, THE MONEY NEEDED TO BUILD THE PLANTS AND DEVELOP THE DISTRIBUTION SYSTEMS. THEY ALSO MAKE THE VALID POINT THAT NEEDED INVESTMENT CAPITAL IS ROOTED IN PROMISES OF HIGH PROFITS AND ATTRACTIVE SUBSIDIES.

WE SHOULD POINT OUT THAT THE MAJOR INSTITUTIONS WERE BUSY WITH FOSSIL AND NUCLEAR FUELS, WHILE THE ALCOHOL FUEL PIONEERS--DRIVEN MORE BY IDEALISM THAN BY PROFIT MOTIVES--

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DEVELOPED THE GRASS ROOTS SUPPORT THAT BROUGHT US TO THIS AND MANY OTHER FORUMS. WE WOULD ARGUE THAT ALCOHOL FUELS AND OTHER RENEWABLE ENERGY SOURCES BELONG TO THE PUBLIC AND THAT AS MANY PEOPLE AS IS ECONOMICALLY FEASIBLE SHOULD BE INVOLVED IN THE PRODUCTION, REFINING, STORAGE, AND COMBUSTION OF BIOMASS FUELS. WE MUST RECOGNIZE THAT AMERICA'S ENERGY MACHINE HAS A VORACIOUS APPETITE AND ONCE IT TURNS TO THE BIOMASS AS A FEEDSTOCK, THE PROFIT DRIVEN MARKETPLACE WILL HAVE GREAT DIFFICULTY IN DETERMINING WHICH BIOMASS COMPONENTS SHOULD BE USED FOR FOOD, CLOTHING, AND SHELTER, WHICH SHOULD BE CONVERTED TO ENERGY, AND WHICH SHOULD BE ALLOCATED TO SOIL FERTILITY AND ENVIRONMENTAL PROTECTION.

WE BELIEVE THESE CRITICAL DECISIONS RELATING TO THE CONVERSION OF BIOMASS TO FUELS, CAN BEST BE MADE BY THE FAMILY FARMERS-THOSE WHO WORK THE FIELDS, LIVE CLOSE TO THE LAND, AND ARE STRIVING TO PROTECT A HERITAGE FOR THEIR SONS, DAUGHTERS, AND OTHERS WHO WOULD SEEK A LIFE IN FARMING. IN BIOMASS FUELS THERE IS ROOM FOR MAN AND NATURE WORKING SCIENTIFICALLY, WISELY, AND IN HARMONY--THERE IS ROOM FOR ECONOMIC GROWTH AND NATION BUILDING. THERE IS, HOWEVER, NO ROOM TO BUILD REMOTE FORTUNES AND INDUSTRIALIZED, ENERGY INTENSIVE CENTERS.

BIOMASS FUELS FROM URBAN AND INDUSTRIAL WASTE CAN BE MOST BENEFICIAL IN MEETING PART OF OUR URBAN TRANSPORTATION NEEDS AND THESE PRODUCTION FACILITIES LEND THEMSELVES TO

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COMMUNITY DEVELOPMENT CONTROL.

WE ARE NOT SUGGESTING A FARM COMMUNITY MONOPOLY (THERE IS PLENTY OF ROOM FOR INDUSTRY AND BUSINESS IN BIOMASS FUELS), BUT RATHER A FARMING FOCUS. THIS FOCUS:

- o ELIMINATES MUCH OF THE TRANSPORTATION OF CROPS FROM THE FIELDS TO A REMOTE DISTILLATION PLANT.
- o OBVIATES THE NEED TO DRY THE ALCOHOL FUEL FEEDSTOCK, A FREQUENT REQUIREMENT WHEN THE GRAINS ARE INITIALLY DESTINED FOR STORAGE OR OTHER MARKETS.
- o OBVIATES MUCH OF THE NEED TO DRY THE DISTILLERS GRAIN OR OTHER HIGH PROTEIN RESIDUES BY LOCATING PLANTS IN CLOSE PROXIMITY TO DAIRY, LIVESTOCK, HOG OR POULTRY OPERATIONS.
- o ENCOURAGES THE USE OF CO^2, WASTE HEAT AND OTHER BY-PRODUCTS IN ENHANCING THE OVERALL EFFICIENCY OF THE FARMING OPERATION.
- o ACCOMMODATES RAPID SCIENTIFIC AND TECHNOLOGICAL ADVANCES. IN MANY PARTS OF THE COUNTRY AN INCREASING NUMBER OF FARMERS ARE EXPERIMENTING WITH SIGNIFICANT CHANGES, OFTEN INCREASING ENERGY EFFICIENCY AND COST EFFECTIVENESS.
- o RECOGNIZES THAT DECENTRALIZED ALCOHOL PRODUCTION FACILITIES ARE LESS PRONE TO THE CONSEQUENCES OF A NATURAL OR MAN-CAUSED DISASTER, PERMITTING CONTINUED AGRICULTURAL PRODUCTION IF SUCH EVENTS SHOULD OCCUR.

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- MINIMIZES WEATHER-RELATED FUEL EMERGENCIES. IN ADDITION, DURING A SHORTAGE OF FOSSIL FUELS, ENERGY SELF-SUFFICIENT FARMING COMMUNITIES CAN HANDLE PLANTING AND HARVESTING REQUIREMENTS AND OTHER FUEL EMERGENCIES WITHOUT SPECIAL ALLOCATIONS OR DISTRIBUTION SYSTEMS.
- PERMITS THE USE OF LOWER GRADE ALCOHOL FUELS (160-180 PROOF) IN FARM EQUIPMENT AND VEHICLES, ELIMINATING THE NEED FOR THE MORE SOPHISTICATED DISTILLATION EQUIPMENT NEEDED TO PRODUCE 200 PROOF ALCOHOL. AS POINTED OUT IN A RECENT ALCOHOL FUELS DOCUMENT, "AN ADDITIONAL ADVANTAGE OF BOTH (ETHANOL AND METHANOL) IN NEAT FORM IS THAT AN APPRECIABLE AMOUNT OF WATER (SAY 10%) CAN NOT ONLY BE TOLERATED, BUT IS LIKELY TO OFFER SOME ADVANTAGES."
- LESSENS THE NEED FOR QUALITY CONTROL. 200 PROOF ALCOHOL LEACHES WATER WHEN EXPOSED TO THE ATMOSPHERE. WHAT WILL BE AN ACCEPTABLE PROOF FOR GASOHOL? HOW WILL THE GOVERNMENT ASSURE A 10/90 MIX? THERE ARE ALREADY REPORTS OF 5/95 AND LOWER GASOHOL MIXES BEING SOLD. IT IS HIGHLY UNLIKELY THAT A FARMER WILL SHORTCHANGE HIMSELF OR HIS NEIGHBORING COMMUNITY. IF HE DOES, THEY HAVE A PROBLEM, NOT THE FEDERAL GOVERNMENT.

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- o REDUCES AIR POLLUTION. CONDITIONS IN SAO PAULO, BRAZIL, HAVE IMPROVED NOTICEABLY SINCE THEIR SHIFT, FIRST TO 10% AND THEN TO 20% ALCOHOL BLENDS. A BETTER SOLUTION, HOWEVER, COULD BE TO PUT ALL FLEET VEHICLES IN IMPACTED CITIES LIKE DENVER AND LOS ANGELES ON 100% ALCOHOL FUELS. RESIDUAL AIR POLLUTION PROBLEMS WITH ALCOHOL FUELS SHOULD LEND THEMSELVES TO RAPID SCIENTIFIC AND TECHNICAL CORRECTIONS.
- o REDUCES DISPOSAL OR INEFFICIENT COMBUSTION OF ORGANIC WASTES BY CONVERTING ALL OR MOST OF THESE WASTES TO BIOMASS FUELS--LIQUID, GASEOUS OR SOLID-- AND BY RETURNING THE REMAINING RESIDUES TO THE SOIL.
- o AIDS IN BALANCING CO^2 LEVELS IN THE ATMOSPHERE. COMBUSTED BIOMASS, WHEN REPLACED BY NEW BIOMASS, DOES NOT ADD CO^2 TO THE ENVIRONMENT, IN CONTRAST TO THE COMBUSTION OF COAL AND PETROLEUM.

THERE ARE MANY SIGNIFICANT TECHNOLOGICAL AND POLITICAL EVENTS OCCURING NATIONWIDE, GENERALLY UNCOORDINATED AND UNCONTROLLED BY THE GOVERNMENT, THAT ARE CAUSING A TURN TO THE BIOMASS AS AN ENERGY FEEDSTOCK--ETHANOL; METHANOL; METHANE PRODUCTION OUT OF ORGANIC MATTER AND CROP RESIDUES AS WELL AS ORGANIC WASTE FROM URBAN AREAS; PYROLYSIS OF ORGANIC MATERIAL IN THE PRODUCTION OF CHARCOAL, METHANOL, AND PRODUCER'S GAS; FLUIDIZED BED COMBUSTION OF ORGANIC FUELS INCLUDING URBAN

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WASTE, FOREST WASTE, WHOLE TREE CHIPS AND OTHER LOG FUELS; THE USE OF CHARCOAL AND WOOD PELLETS IN LIEU OF METALLURGICAL COAL; AND, FINALLY, THE DIRECT BURNING OF WOOD IN STOVES, BOILERS, AND FIREPLACES. AS THE ECONOMICS IMPROVE, TECHNOLOGIES ADVANCE, AND PUBLIC AWARENESS OF THE GREAT VALUE OF BIOMASS FUELS MOUNTS, THEIR AVAILABILITY WILL SHARPLY DIMINISH AND WE COULD, UNLESS WE ACT WISELY, UTILIZE THIS ENERGY SOURCE AT THE EXPENSE OF THE ENVIRONMENT--THREATENING GROUND AND TREE COVER AND, CONSEQUENTLY, THE WATERSHED.

ADVANCES IN MANY OF THESE AREAS MAY SUGGEST ADDITIONAL DELAYS IN THE CONSTRUCTION OF ETHANOL PLANTS. THERE APPEAR TO BE SOME PROMISING ADVANCES IN DEWATERING TECHNOLOGY, BOTH IN DISTILLATION AND MEMBRANE TECHNOLOGIES. THERE ARE ALSO CLAIMS THAT THE ADVANCED REFINING OF BIOMASS INTO ITS SOLID, LIQUID AND GASEOUS FRACTIONS WILL PROVIDE TRANSPORTATION FUELS CONSIDERABLY CHEAPER THAN THROUGH THE FERMENTATION/DISTILLATION PROCESS.

IN ADDRESSING THE ALCOHOL FUELS ISSUES, WE HAVE THREE MAJOR NEEDS: 1) IDENTIFYING AND VERIFYING THE MANY CLAIMED ADVANCES--MOST OF WHICH ARE SPRINGING UP OUT THE BACKYARDS, BARNS AND BASEMENTS--; 2) EXPLAINING THE DIFFERENCE BETWEEN THE VARIOUS BIOMASS FUELS; AND 3) CONDUCTING A MAJOR EDUCATION PROGRAM AMONG FARMERS AND OTHERS INTERESTED IN THE REFINING OF BIOMASS

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INTO PREFERRED FUELS. UNTIL GASOHOL BECAME A HOUSEHOLD WORD, AMERICANS WERE LARGELY IGNORANT OF THE GREAT POTENTIAL OF REFINED BIOMASS. THE DIRECT BURNING OF WOOD DID NOT ALERT THE PUBLIC TO THIS POTENTIAL. THE FERMENTATION DISTILLATION OF BIOMASS INTO ALCOHOL FUELS IS A REFINING PROCESS AS IS THE PELLETIZATION/DENSIFICATION OF BIOMASS, ITS GASIFICATION, AND ITS THERMOCHEMICAL CONVERSION INTO A VARIETY OF FUELS AND PRODUCTS. IN FACT, ONE OF THE ADVANTAGES OF BIOMASS IS THE MANY METHODS THAT CAN BE USED IN ITS REFINING--MOST OF WHICH ARE YET TO BE OPTIMIZED, LET ALONE SYNERGIZED. WE, THEREFORE, HAVE BEFORE US A MAJOR EDUCATIONAL EFFORT TO ESTABLISH THE REQUIRED DEGREE OF UNDERSTANDING BEFORE WE CAN SENSIBLY HARNESS THE FUEL POTENTIAL OF BIOMASS.

IT IS, HOWEVER, WELL PAST THE HOUR TO SUGGEST THAT WE REIGN IN THE AMERICAN FARMER WHILE WE FURTHER STUDY THE ALCOHOL/ BIOMASS FUELS ISSUE. FOR WHATEVER REASONS, WE MISSED THE CHANCE TO ADDRESS THE SUBJECT OF BIOMASS FUELS IN A "PROPER AND POLITE" SCIENTIFIC AND ACADEMIC MANNER. THE AMERICAN BULL IS OUT OF THE BARN AND HELL BENT FOR NEW ENERGY PASTURES. THE BEST WE CAN DO IS TO ALL LEARN AND WORK TOGETHER COOPERATIVELY IN ORDER TO TAP ALL THE HUMAN ENERGY AND CREATIVITY THAT HAS BEEN RELEASED AS A RESULT OF THIS NEW DIMENSION. WE BELIEVE THIS CAN BE DONE, BUT ONLY BY INVITING THE PARTICIPATING PUBLIC INTO AREAS THAT WERE PREVIOUSLY RESERVED FOR BUREAUCRATS, SCIENTISTS, AND ACADEMICS.

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LATER IN THIS PAPER, WE WILL SUGGEST THE FUNDING OF 56 BIOMASS FUELS PLANTS--ONE IN EACH STATE AND POLITICAL ENTITY. BECAUSE OF THE GASOHOL/ALCOHOL FUELS MOMENTUM, IT IS LIKELY THAT ALL OR MOST OF THESE PLANTS WILL PRODUCE ETHANOL. THIS DOES NOT, HOWEVER, PRECLUDE TYING THESE PLANTS, THROUGH AN INFORMATION/ EDUCATION LOOP, WITH OTHER BIOMASS REFINING PLANTS ALREADY BUILT IN MANY AREAS OF THE COUNTRY.

WHAT NEEDS TO BE DONE?

- ESTABLISH REGIONAL CENTERS IN STATE COLLEGES AND UNIVERSITIES TO PROVIDE UNBIASED AND OBJECTIVE INFORMATION TO FARMERS, SMALL BUSINESS, AND CITIZENS ON ALCOHOL/BIOMASS FUELS.
- PROVIDE FUNDS SO THAT THESE INFORMATION CENTERS CAN RECEIVE CALLS FROM CITZENS AT NO CHARGE AND THAT QUALIFIED PERSONS WILL BE AVAILABLE TO ANSWER ALL TELEPHONE AND WRITTEN INQUIRIES.
- ESTABLISH AN AUTOMATED DATA SYSTEM (PERHAPS AT THE SOLAR ENERGY RESEARCH INSTITUTE, GOLDEN, COLORADO) TO PROCESS, STORE AND DISSEMINATE INFORMATION AND DATA ON STATE-OF-THE-ART TECHNOLOGIES RELATING TO SMALL AND MEDIUM SIZED ALCOHOL/BIOMASS PRODUCTION PLANTS. THIS FACILITY, TIED INTO THE REGIONAL CENTERS AS WELL AS OTHER INSTITUTIONS, WOULD ALSO RECEIVE AND DISSEMINATE INFORMATION ON NEW TECHNOLOGIES AND ADVANCES TO EXISTING SYSTEMS.

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- o PROVIDE FUNDS SO THAT FEDERAL AND STATE GOVERNMENTS CAN DEVELOP TRAINING COURSES, BOOKLETS, AND HOME STUDY COURSES ON ALCOHOL/BIOMASS FUELS AND MAKE THESE MATERIALS AVAILABLE TO THE PUBLIC AT NO CHARGE THROUGH THE REGIONAL CENTERS.
- o ENCOURAGE PEOPLE-TO-PEOPLE TECHNOLOGY TRANSFER OPPORTUNITIES WHERE FARMERS, INNOVATORS, SCIENTISTS, AND ENGINEERS SHARE INFORMATION AND TECHNOLOGY WITH EACH OTHER AND WITH THE REGIONAL CENTERS IN ADVANCING THE REFINING OF BIOMASS.
- o ENCOURAGE THE CONGRESS AND THE GOVERNMENT (FEDERAL AND STATE) TO PASS LEGISLATION AND TO IMPLEMENT REGULATIONS THAT WILL ADVANTAGE FARMERS AND FARM COMMUNITIES IN THE PRODUCTION, DISTRIBUTION, AND MARKETING OF ALCOHOL FUELS DERIVED FROM RURAL BIOMASS. INCLUDED WILL BE EFFORTS TO ENCOURAGE THE USE OF 100% ALCOHOL FUELS ON THE FARM, IN THE FARM COMMUNITY, AND IN FLEET CARS OPERATING IN CITIES WHERE AIR POLLUTION IS A SERIOUS PROBLEM.
- o ENCOURAGE THE DEVELOPMENT AND MANUFACTURE OF ENGINES, ENGINE COMPONENTS, AND OTHER EQUIPMENT TO PERMIT THE COMBUSTION OF LOW GRADE (160-180 PROOF) ALCOHOL FUELS AND OTHER BIOMASS FUELS. INCLUDED WILL BE AN EFFORT TO DEVELOP RETROFIT KITS TO PROVIDE EFFICIENT ALCOHOL/BIOMASS COMBUSTION IN TODAY'S

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FARMING FLEET.

- WORK WITH ENVIRONMENTAL GROUPS, FARMERS, FARM ORGANIZATIONS, SOLAR ENTHUSIASTS, AND OTHERS TO ASSIST THE GOVERNMENT IN ENSURING THAT THE ENVIRONMENT IS VOLUNTARILY PROTECTED AS BIOMASS FUELS BECOME INCREASINGLY IMPORTANT IN THE NATION'S ENERGY MIX.
- ENCOURAGE BIOLOGICAL FARMING PRACTICES, TO INCLUDE COMPREHENSIVE SOIL AND ENVIRONMENTAL MONITORING IN ORDER TO ENSURE THE PROPER BALANCE OF NUTRIENTS, MICRONUTRIENTS AND MICROORGANISMS IN MAINTAINING SOIL FERTILITY. COMPOSTING, INTEGRATED PEST AND CROP MANAGEMENT, AND BIOLOGICAL FERTILIZERS ARE ESSENTIAL ELEMENTS IN THE PRODUCTION, PROTECTION, AND UTILIZATION OF BIOMASS.
- WORK WITH MUNICIPALITIES, TOWNS, AND CITIES IN ENSURING THE PROTECTION OF ORGANIC WASTES FROM TOXIC SUBSTANCES. THIS CAN BEST BE DONE AT THE SOURCE AND NOT IN WASTE WATER TREATMENT PLANTS. THESE VALUABLE WASTES SHOULD BE RETURNED TO THE SOIL TO PROVIDE THE ORGANIC AND NUTRIENT BASE FOR THE PRODUCTIVE AND SUSTAINED HARVEST OF BIOMASS.
- EXPAND THE CONCEPT OF ALCOHOL FUEL PRODUCTION TO EMBRACE THE FULL NOTION OF BIOMASS REFINING. GREATLY EXPAND THE NATION'S EFFORTS TO DETERMINE THE MOST EFFICIENT PROCESSES. INCLUDE THE PEOPLE IN THIS SEARCH.

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- o Work to ensure the balanced use of biomass as a food and fiber source and as a fuel. Prudent and wise use of the biomass will obviate the painful decision of denying food to the hungry in order to provide mobility for the privileged.

WHAT SHOULD THE CONGRESS DO?

- o Provide funds as needed and direct the government to proceed along the lines outlined above. In this process, provide opportunities and funds for the pioneers instead of those individuals and systems that delayed the meaningful advent of biomass fuels.
- o. Limit subsidies to reasonable and declining levels and direct these forces in support of farm and farming communities. Gear all subsidies to fossil oil and gas saved. The Alcohol, Tobacco and Firearms (ATF) monitoring requirements will provide information on gallons of alcohol fuels produced and consumed/marketed, as well as other operating data on a farm or farm-sized alcohol plant. This data, certified by the producer and verified by the ATF, could serve as the basis for disbursing the subsidies.
- o Include methanol and methanol/ethanol blends in the subsidy package, recognizing that methanol can be made from coal on a cost effective basis.

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- Ensure that a major proportion of the research and development funds appropriated by the Congress for fuels be used to directly support needs identified by the farm community.
- Take steps to ensure that low cost, guaranteed loans are available for the construction of farm or farm community plants.
- Make provisions for the construction of an on-farm or farm community-sized biomass refining plant in each state. These plants would be used for demonstration, educational and research purposes. Limit the amount of Federal funds to $50,000. Make these funds available directly to farmers or groups of farmers. The State Departments of Agriculture could be most supportive in terms of funding and technical assistance, but the plants should be on operating farms or in direct support of operating farms. These plants should be tied in, through an education/information loop, with each other and with other types of biomass refining plants.
- Make provision for engine research, development, and demonstration in the biomass fuels area. Ensure direct funding support for individual and small company pioneering efforts that have demonstrated promise.

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AS INDICATED EARLIER, ALCOHOL AND BIOMASS FUELS PROVIDE A UNIQUE OPPORTUNITY TO DEMONSTRATE THE GREAT CREATIVE POTENTIAL OF THE AMERICAN PEOPLE, PARTICULARLY THE FARMERS. PERHAPS WE DO NOT HAVE AN ENERGY CRISIS, BUT WE CERTAINLY HAVE A SEVERE AND CHRONIC ENERGY PROBLEM DEMANDING THE MORAL EQUIVALENT OF WAR--AS CALLED FOR BY THE PRESIDENT. IT IS ENTIRELY POSSIBLE TO BUILD FARM OR FARM COMMUNITY-SIZED BIOMASS REFINING PLANTS AND TRAIN OPERATORS LIKE WE BUILT BOMBERS AND TRAINED PILOTS AND CREWS DURING WORLD WAR II. USING THIS LEVEL OF URGENCY, 2000 PLANTS PRODUCING MORE THAN A BILLION GALLONS OF BIOMASS FUEL BY 1982 IS POSSIBLE.

(The attachment to Mr. Albright's statement is held in the subcommittee file.)

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Mr. ALBRIGHT. There are two things that I would like to comment on, if I may.

I am Darold E. Albright, executive director, International Biomass Institute.

One, I want to bring to your attention that our last issue of Biotimes is totally devoted to alcohol fuels. I have submitted a copy of it for the record, and I will see that everyone has a copy by tomorrow morning.

Second, this morning Mr. Fithian asked a question regarding Brazil and what is happening in Brazil. I wanted to point out that the International Biomass Institute just completed a study for the Agency for International Development that was handed in last week. As soon as that is released, I will see that you have a copy of it. It is all on the Brazilian alcohol situation.

Mr. ROSE. Thank you very much. Mr. Jeffords.

Mr. JEFFORDS. I would like to talk a bit about the macro situation.

Let me refresh your minds about the President's decontrol program and the cost involved. Then let me ask you some questions relative to the potential for gasohol as a substitute for this type of a program with the prices involved.

As you remember, the President's program is to decontrol the old oil price and to stimulate additional production and to reduce consumption to a certain extent.

It is my understanding that at least the optimistic view of Mr. Schlesinger was that that would increase production by 750,000 barrels a day. The marginal cost per barrel because of the increased price overall would be somewhere between $40 and $50 per barrel. Other estimates decrease considerably the amount of production and put the marginal barrel costs up around $100 a barrel. Let's assume the low cost estimate of $40 a barrel at about $20 billion a year to the American consumer.

If we were to take the position that instead of the President's program we were to mandate that this Nation by 1985 would use 10 percent alcohol in gasoline or replacement fuels, then would it be posssible for the alcohol industry to produce sufficient quantities in that length of time, like 5 or 6 years, to produce 800,000 barrels of oil a day at a price that would be less than $40 a barrel?

I will address that to any member of the panel.

Mr. MIDDAUGH. I will speak to that. The very Government studies that you have seen, probably, indicate that with large-scale production with the lead time of 1½ years to 2 years that it is not likely to be possible.

However, I predict that within a year you will see enough on the farm-scale where they are going to be manufacturing many thousands of these units so that they will be quite self-sufficient without any Government money at all.

Mr. JEFFORDS. I support Mr. Bedell's bill. I think he supports mine also. What we would do would be to mandate that the refiners, or whomever it is that distributes gasoline, replace 10 percent of their gasoline with either a synthetic fuel or alcohol. This would create the demand without the necessity for the appropriation of funds.

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Presuming you could make the law solid enough so that people could rely upon it, then it would require the car industry to increase the miles per gallon and we could require oil companies, as they are doing in Brazil now, to provide the mixture from whatever source they could get it, supposedly at the least cost whether it be synthetic fuel from coal or alcohol—this would vary from region to region depending upon what you could produce.

I wonder how you feel about that as a feasible approach and whether it would solve some of the problems we have?

Mr. MIDDAUGH. I have not really addressed that problem because I am concerned mostly with the farm scale at the present time. But I still say that the large plants are going to have a long lead time and a very difficult time gearing up for this production scale that you are talking about.

Mr. ALBRIGHT. One of the problems you might encounter is this. Brazil got into this to take care of the sugarcane prices.

Their government could move by fiat and consequently it is not always 10 percent nor 20 percent. It is not always 90–10, 80–20. It is whatever where we are in the world sugar market. If we were to come down with a mandate such as this, and we had, as we talked about this morning, a bad corn year, a bad crop year, or something else, then do we have the leeway to slide out the back door on this and say that this year we go to 95–5. If you build in the flexibility, then you may indeed have a possibility. Without the flexiability, I wonder if we have quick enough time to change with our form of Government.

Mr. JEFFORDS. The synthetic fuels people say they can do it all. It is a question of whether there would be a piece of the market for the alcohol business which I would hope there would be.

I would like to know from you in my last few seconds as to how competitive do you feel the alcohol production is with synthetic fuel from coal at this point from a cost point of view. Can anybody answer that?

Mr. CROMBIE. What is the cost of alcohol or the synthetic liquid fuels from coal at the present time? I think it is about $1.60 a gallon. Is that right?

Mr. JEFFORDS. The price they give me is on a large-scale production. It would be somewhere between $25 a barrel up to $35 or $40 a barrel. I, unfortunately, have been working in barrel terms with them, and my computer in my mind is not quite quick enough to compute that into gallons and cost per gallon.

Mr. CROMBIE. I think that converts to over a dollar a gallon. That is the number I have seen. Between myself and Dr. Middaugh, and from some of the local people and the ADM, all up the way up to the big ones, they are way below a dollar a gallon.

Mr. JEFFORDS. You could underproduce synthetic fuels right now, as far as you are concerned, with alcohol.

Mr. CROMBIE. Yes, mine is about 32 cents a gallon.

Mr. JEFFORDS. Thank you.

Mr. BLASER. We must leave the free enterprise where it is. This is the greatest possibility.

Mr. ROSE. Mr. Bedell.

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Mr. BEDELL. Let me thank all of these gentlemen for their testimony. I want to thank you gentlemen for all the work you have done.

Dr. Middaugh, did you indicate that in 3 weeks you built the plant that you brought out here?

Mr. MIDDAUGH. Yes, with three students.

Mr. BEDELL. Since 3 weeks ago you have already been back and already organized a corporation to make these, and you have already started to build plants; is that right?

Mr. MIDDAUGH. That is correct. In addition, we are establishing a national training program starting in the third week in June where they have converted Methodist ministers making alcohol. We are going to train people on the small farm scale to operate these plants efficiently.

Mr. BEDELL. My plea with you is that maybe we need you in the Government too. I never saw anything move quite that fast in our Government. That is tremendous.

Mr. MIDDAUGH. There are a lot of people helping.

Mr. BEDELL. What do you figure the costs will be for those plants?

Mr. MIDDAUGH. Under $25,000.

Mr. BEDELL. My understanding is that with the other equipment needed that the farmer would be able to set up an operation for something under $40,000.

Mr. MIDDAUGH. That is correct.

Mr. BEDELL. That is something that is within reach of some of our farmers. I took further from your testimony that you believe that one of the problems is that the information and the facts and figures we have have to do with plants that have been built some long time ago for beverage-grade alcohol and those figures, if we use them, to either justify or cause us to feel that we cannot produce alcohol, it can be very misleading because new technology is coming up very rapidly and what can be done is not necessarily what was done many, many years ago. Is that accurate?

Mr. MIDDAUGH. That is correct. One hundred and forty Btu's, approximately, for a beverage-grade plant of the type I worked with and the commercial and small-scale units are now at 40,000 or less Btu's. It is a savings of 100,000 Btu's per gallon of alcohol.

Mr. BEDELL. Mr. Crombie, you say you hope you will be able to do this and that is pretty exciting. That will help solve the problems.

Do I understand that you have applied for a loan at the Department of Energy? Is that right?

Mr. CROMBIE. The Department of Agriculture's Farmers Home Administration.

Mr. BEDELL. Do you know where you stand on that?

Mr. CROMBIE. It looks pretty bleak.

Mr. BEDELL. I will speak as one person, but you are talking about $100,000; is that right?

Mr. CROMBIE. Yes.

Mr. BEDELL. Some of us in Government think that to invest $100,000 to find out whether you can do what you think you can do is an important step compared to what it would mean to other things.

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Let me ask that you check back with us because at least I am one who is interested in this. If I were in business, I would not hesitate to invest that kind of money to try to find out. I would like to help you in any way I could.

Mr. CROMBIE. I might ask anyone if they have ever walked into their local bank or lending institution and asked them for money to build a still. I have done that in about 15 banks in Chicago and savings and loans, and private investors, and I have calls from Africa, and Australia, and thousands and thousands of people basically come and they want me to go and build a plant. Mr. Middaugh is getting into the same thing, so financing has been tough.

Mr. BEDELL. We are not talking about a bank. We are talking about the Federal Government where we have a serious energy problem.

Mr. CROMBIE. The Farmers Home Administration is a bank to us out in the farmers' community.

Mr. BEDELL. Mr. Middaugh, it appears that what you have done could go quite a ways toward helping us with our alcohol fuel problems. We authorized four pilot projects in the last farm bill. Of those projects none of them were for alcohol fuels, as I understand it—that is, from feed grains, for example, for gasohol.

Could you comment on that?

Mr. MIDDAUGH. I would like to for the reason that what we really need to prove the difference in Btu requirements for production of fuel grade versus commercial distillation and beverage-grade alcohol is one plant to be on display and examined by impartial observers so we can prove we can fly.

Many people say the bumblebee is an engineer so it cannot fly. They have said the same thing about a fuel-grade alcohol plant.

The problem is that not one of the four plants for which loans have been granted seems to fit this requirement of an impartial granting of a loan to support a fuel-grade alcohol plant.

It is my understanding that the fourth loan is for a firm which is already in beverage alcohol production which does not plan to make alcohol for fuel grade but rather for industrial use and place it in a State where at the time it was declared had a law against distillation.

Mr. BEDELL. My time has expired, but I would like for you, if you could, to talk to me because there are some of us who would like to see this pursued, if possible, so that a pilot plant would be set up and we could find out what we really can do in this regard both in large plants as well as small ones.

Mr. MIDDAUGH. I applied for a loan on cellulose conversion and damaged grain conversion and it was sent back as not being worthy of funding.

Mr. BEDELL. Thank you.

Mr. ROSE. Dr. Middaugh, let me ask you this. Where did you apply for that grant?

Mr. MIDDAUGH. It was a USDA program.

Mr. ROSE. What were the four pilot projects that USDA had in this area? Are you familiar with them?

Mr. MIDDAUGH. One is sugarcane which is a well-known Brazilian process which I think could be studied down in Brazil.

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Mr. ROSE. Where was there a project for an alcohol plant in a State that did not allow distillation?

Mr. MIDDAUGH. I am talking about Midwest Solvents with Mr. Cray. He is the owner and he has been negative on our fuel alcohol since I've heard many, many comments about this. I have never talked to the gentleman, but I have read much of his work. I understood it was to be placed in the State of Texas at a time when it was not legal to have a distillery. I could be in error on this point, however.

Mr. ROSE. I understand you will be a witness tomorrow.

Mr. MIDDAUGH. That is correct.

Mr. ROSE. Mr. Kelly.

Mr. KELLY. Thank you, Mr. Chairman.

Dr. Middaugh, do I understand now that you have designed and constructed an operational farm-type still that will produce fuel grade alcohol that will be satisfactory to use in combustion engines?

Mr. MIDDAUGH. Yes, sir. In the Lincoln Memorial area, we produced it. It was at a rate better than 22 gallons an hour from corn mash with rather low alcohol because I did not have time to get a good mash at the level of 190 proof or 95 percent.

Mr. KELLY. Then, as far as you know, this is an effective practical operational unit.

Mr. MIDDAUGH. We think so.

Mr. KELLY. Then there does seem to be a need for energy in this country. It is widely accepted that alcohol, at least a mixture of alcohol with gasoline, is a good substitute for gasoline.

You made some statement to the effect that all that was needed was for the Government to get out of the way.

Mr. MIDDAUGH. That is what the farmers said. That is a quotation from the farmers.

Mr. KELLY. Then do you think that the Government really needs to do anything?

Mr. MIDDAUGH. Yes, they do. I neglected to point this out. Some of these people would like to be able to buy grain at the same advantageous level that the large distilleries are going to be able to buy it at but buy it for the small-scale use. This is not clearly apparent to me in the current version of the bill.

Mr. KELLY. Based on the experience that you have had with the Government—and any of you gentlemen could answer this—would you judge the fact that the private sector, like the banks and all the investors, that is, that they do not want to invest in these various devices and that signals that they are a bunch of dummies and that you are going to go to the Government because the Government's track record for investing and spending money is so good that you know that what they do is going to be wise? Do you think that if the Government will put money into it, it must be right and the banks are all wrong? Is that the situation?

Mr. MIDDAUGH. No. Your interpretation does not come through correctly.

What we are saying is this. This is a new experience for the banks. I have had trouble with other regulatory people who say they have never met our problem and they do not know how to deal with it.

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What we are saying is that all the farmers want to do is be allowed to make the units and use their own grain on their own farms for fuel use so that they can get their crops in this year.

Mr. KELLY. But do I understand you correctly that you think the Government is the only institution in this country that has the wisdom to properly invest money in the production of alcohol as a fuel?

Mr. MIDDAUGH. No.

Mr. KELLY. The private sector just cannot see how to make a buck but we in Government can; is that it?

Mr. MIDDAUGH. I disagree completely, sir. That is not what I said.

What I did say was that the farm-based units are going to produce their own and make their own. They are not asking for loans on these small units.

What I also said was this. If a credit is to be allowed for discounted purchase of grain for fuel use, then the small-scale and middle-scale and the large-scale plants should all be on a equal footing. That is what I am trying to say.

Mr. KELLY. I see. Thank you.

Mr. CROMBIE. Let me comment. First of all, Archer Daniel Midland is private, and they have invested money into making alcohol fuel and they have done very well.

However, there are 30-some applications for guaranteed loans for the large plants. All the people that were not funded, and many of them looked like they were feasible, simply cannot get funding. There is a group in Kansas, the group in Missouri, the group in Crookston, Minn., Wrenville, Minn., and in Michigan. There are a bunch of others who were not funded and they have no chance at all of getting funding except by either going public or raising private capital which they have not been able to do to this date.

Then there is the Federal Government.

Mr. KELLY. Inasmuch as you have been heavily into this, what do you think the reason for that is? Do you think the entire private sector is all in the hip pocket of the oil companies?

Mr. CROMBIE. Yes, there is no question.

Mr. KELLY. All the money in the United States is controlled by the oil companies and nobody wants to make any money because the oil companies won't let them. Is that it?

Mr. CROMBIE. Not 100 percent, but there has been direct and indirect resistance to that and which shows that.

Mr. ALBRIGHT. There is a speculative nature associated with this. If we were to find out if a bank were to invest a great deal of money in plants such as this and the process then became competitive the gasoline OPEC could lower their prices and put the bank in a bad place. It happened in 1907. It was written up. The bank is not in the position to control these prices, so with the speculative nature, they are staying away.

Mr. KELLY. Thank you.

Mr. ROSE. Gentlemen, let me recognize Mr. Fithian.

Mr. FITHIAN. Mr. Chairman, I know we are anxious to move on to other witnesses, but let me say this. I read the articles and materials on Mr. Crombie's work. I have not read about Mr. Middaugh's work. I would be curious to know two things.

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First of all, you described, Mr. Crombie, that you threw this together very quickly and it all operates, but you do have a Ph. D. in microbiology. Is that right?

Mr. CROMBIE. Yes.

Mr. FITHIAN. How much training and education in the field do you have to have before you can hit the right combinations of solar stills, and mash mixes, and all the rest of it to make it come out as an operation?

Mr. CROMBIE. I have a Ph. D. in microbiology. I also spent over 10 to 12 years doing cancer research which has little or no application as to fermentation. I do know the principles of fermentation. It is quite simple.

Mr. FITHIAN. You are saying that your solar still operation, as you have laid it out, would or would not be adaptable to the ordinary farmer on his farm?

Mr. CROMBIE. It could, but it does not necessarily have to be.

Mr. FITHIAN. Let me ask you, Dr. Middaugh, this. You estimate that the cost of the plant on the farm would be about $40,000, or under that.

Mr. MIDDAUGH. That is correct.

Mr. FITHIAN. How many farmers would this supply in terms of fuel alcohol?

Mr. MIDDAUGH. At 22 gallons per hour—22 to 25—we are talking about 500 gallons a day or approximately—you can multiply it out by 330 day operating time as well as I can.

But we are talking about 175,000 gallons theoretical which is nonsense unless you set it up on a continuous basis.

But the typical unit would supply about $8,000 worth of fuel in a single year to about 4 or 5 farmers.

Mr. FITHIAN. You believe your plant becomes practical in a financial sense in investing the $40,000 at the present interest rates to serve four or five farmers?

I am not badgering you. I just do not know.

Mr. MIDDAUGH. The payoff would be less than a year and a half.

Mr. FITHIAN. I would like to visit with these folks all week, Mr. Chairman, but I suppose I had better subside at this point.

Mr. ROSE. I thank the gentleman. You have 5 minutes. You can go as far as you want to. Maybe they can have dinner with you tonight.

Mr. FITHIAN. I am concerned about what you are recommending as policy. I gather what you are suggesting is that whatever we do in terms of loan rate funds or urgings of the Department of Agriculture, or whatever it is, that this would be to channel some portion of their loan funds into small on-farm operations.

Mr. MIDDAUGH. That is correct.

Mr. FITHIAN. Mr. Chairman, may I go out of order and ask Mr. Brown from the Department whether or not that is possible or impossible?

Mr. ROSE. Certainly. Go ahead.

Mr. FITHIAN. Mr. Brown, these gentlemen have testified to something and that makes sense to me. It seems to make sense. I have not heard anything more than you have heard, but we did put a fair amount of loan guarantee money together. We did it for the promotion of the development of alcohol fuels.

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Quite obviously the farmer is the highest per capita consumer of energy in the United States. So, to the extent that we solve his problem with our on-farm small-time operation, we solve the whole problem in a substantial way.

Is there any reason why the Department could not, or any stipulation that would prevent the Department from supporting a loan guarantee proposition with regard to this?

Mr. BROWN. The Department has been taking a look at the small-scale alcohol plant as an option. We could report to you on this.

Mr. FITHIAN. Would you do this? I think we may have struck on something. As I said earlier on, Mr. Chairman, I was quite interested in what I had read about Mr. Crombie's operation. It seems to me that we ought to be able to match up Government policy with commonsense.

If these guys are wrong then they are wrong, but we are not risking very much. We are risking $100,000 for Mr. Crombie and $40,000 for Mr. Middaugh. You could take that out of the petty cash fund.

Mr. CROMBIE. The problem I have with the Department of Energy and the Department of Agriculture is that they, in fact, have not asked any input from myself or Mr. Middaugh, or Albert Turner in Alabama, or the others. They simply have not asked us. They are doing their fancy "study" and their feasibilities forever. It simply has not come out. We know how it will read already.

Mr. FITHIAN. I will close on this note, Mr. Chairman. If you heard my comment this morning, you know that I am not the greatest supporter of the activities down there, but let me say this in defense of the whole operation.

As just one Congressman, I get over the period of a year, 40 or 50 foolproof notions as to how to save the world, from constituents and other individuals. I am sure the Departments must get thousands of these on a weekly basis.

I suspect it is a little difficult. One of the purposes of this committee hearing is to try to sort out in such a way that we know what is possible and your reputations obviously preceded you or you would not be here. But that tends to sort you out somewhat from the literally thousands of people that say that there was once a carburetor that allowed someone to go 100 miles to the gallon. Nobody ever knows where the carburetor is. There are lots of old wives tales like that. So, there is that problem which I recognize.

Thank you, Mr. Chairman.

Mr. ROSE. Mr. Grassley.

Mr. GRASSLEY. Let me follow up on what Mr. Crombie was saying. You mentioned going to all the banks in Chicago and the savings and loans.

Mr. CROMBIE. A significant number of about 15.

Mr. GRASSLEY. All right.

You got calls from South Africa and Australia. I thought you were leading up to a point where you were getting favorable reaction, but the point is that you have all this interest even from outside the country but nobody is willing to help. Is that right?

Mr. CROMBIE. There is favorable reaction and generally the answer that you get is that it really sounds good. The plan looks

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good. Go ahead and build it and then show us how it works. If it works, that's fine.

I can understand that to an extent because it is new and it is basically different.

The problem has been this. Initially the problem is to get some funding somewhere. I am not so much concerned about myself as I am other farmers. I have convinced most of the companies that are making the machinery that I am assembling to give it to me, and I have most of it now free.

This is on good faith that we are going to set it up and try it. If it does not work, we will simply change it so that it does work. That is the way we are approaching it. We are not saying it won't work at all. Fermentation has been around for ages. At the worst the situation will be that we will go to a modified semiautomatic batch system, but I know the vacuum distillation works and the solar works, and I want to look at the continuous flow system.

Mr. GRASSLEY. Once you get plant number one set up then you feel like you will have the promises for financing for subsequent plants?

Mr. CROMBIE. Yes.

Mr. GRASSLEY. What you are doing to this point is then that you need $100,000 capital starter on top of that, or would that make your job easier?

Mr. CROMBIE. That would have made my job easier.

The concern is timing. The work we are doing here today will eventually, over a period of time after much debate, I assume, result in some action to help the gasohol and the alcohol fuels program along.

What we are talking about is not just us, but literally hundreds of other farmers who want to help and they want to do their fair share. It is going too slow.

Mr. GRASSLEY. So you have lost valuable time because of the inability to get the $100,000 immediately.

Mr. CROMBIE. Or any amount.

Mr. GRASSLEY. Thank you. Thank you, Mr. Chairman.

Mr. ROSE. Thank you. Mr. Daschle.

Mr. DASCHLE. Let me continue this discussion. This is exactly the crux of the problem here. We have all of this interest and this knowledge, but we do not seem to be able to direct it.

If I recall, just last week this committee voted to provide 180 new demonstration plants. It is hard for me to understand why one of these plants could not be specifically for that purpose. I would like to ask if any of the other members have any information on that about why it could not be used. It seems to me that this is exactly what we were trying to do.

If I am not mistaken, the Senate has already passed it as well and this should be available. I don't see why we can't push this even more emphatically with the kind of testimony you have presented today.

Mr. CROMBIE. The President, I understand, has skipped the Department of Agriculture and the Department of Energy and has made available some $11 million to build 100 small farm or small community plants over the next year or year and a half.

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What you have to realize about the people working in alcohol production is that we basically have very few or no secrets. If it is seen fit that I should not be funded, I would recommend very highly that you fund Dr. Middaugh or Mr. Zeithheimer in Minnesota. He went through hell the first time he built the plant. He went through razzing. I have been through the razzing. Because I got raided, I am a bad guy in the community.

Now they do not think I am so bad because I am making fuel. But there are hundreds and hundreds of other situations. I don't care who gets funded, but I want to see someone get something fast because they are prepared. They will learn. They will make it go right now. It is happening. It could go much smoother and much faster if money were available.

Mr. DASCHLE. Mr. Brown, let us assume for the moment that we pass this tomorrow morning and it was on the President's desk by Friday. This is hypothetical. Let's assume for the moment that the President has signed it and that he signed it swiftly.

How soon would a person like Mr. Crombie be able to apply for the demonstration plant and with all the bureaucracy involved, how soon could we turn this around to actually be of use to Mr. Crombie?

Mr. BROWN. My understanding is that the program involves the Economic Development Administration and Community Services Administration. This is not the Department of Agriculture.

Mr. DASCHLE. I thought the Farmers Home was involved.

Mr. BROWN. My understanding is that it is not and that it is EDA.

Mr. DASCHLE. That is the whole bureaucracy.

Mr. BEDELL. The gentleman is talking about an FmHA bill that passed through the committee about 3 days ago. It is an FmHA loan.

Mr. BROWN. This is not what the President mentioned?

Mr. BEDELL. No. Congressman Daschle is talking about an FmHA authority that we passed, at least, in our committee——

Mr. DASCHLE. I do not care what agency it is, but let's assume that it is the Farmers Home Administration. Is there any reason why we have to wait three or four months to process all this? Can we be of assistance so that this can be more expeditious insofar as Federal demonstration programs are concerned?

Mr. BROWN. I would suggest that if we were to come back tomorrow and report to you concerning this small-scale option that I mentioned earlier, we could also address the timing requirements under this.

Mr. DASCHLE. I would appreciate that.

Before my time is up, let me ask Dr. Middaugh this.

You were talking about the road blocks. You were talking about the problems that you have had structurally in trying to accomplish what you are doing.

One of the most important road blocks is the permit. You talked about getting the permit and the need to change that.

Can you describe what other road blocks should be taken care of legally to provide a clear passage in getting this job done?

Mr. MIDDAUGH. I think financing is really the key point that holds everything back.

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Mr. DASCHLE. If you have the permits and financing, are there any others?

Mr. MIDDAUGH. We need a cheaper denaturant. We would like to denature and comply because none of us want to create a very bad situation with undenatured alcohol.

The funding is really the big thing.

Mr. DASCHLE. The last question I have relates to the rating of cellulosic materials. We have heard a lot about the number of Btu's required to produce alcohol. Could you very briefly rate in general the kinds of cellulosic materials that works better than others?

Mr. MIDDAUGH. Yes. Actually cellulose, pound for pound, has the same sugar content and the same energy value of glucose as any of the starches. However, some of them are much easier to work with. For example, the elevator dust is finely ground and I can convert that with no further grinding with my cellulose enzyme, and I make 15 percent alcohol out of that and 85 percent out of the starch.

This is on the grain elevator dust.

Things like sugar beet pulp are much earier to digest than some of the straws, so I am struggling with certain materials in combination with chemical and enzyme treatment. This is a year or two off, I think, before we really have a good look at it.

Mr. DASCHLE. Thank you.

Thank you, Mr. Chairman.

Mr. ROSE. Thank you.

Gentlemen, we appreciate your presence. Your testimony has been very helpful. We will excuse you now.

Our next panel has Mr. Clint Fogde, director, Long Range Planning and Technical Services, Land O'Lakes, Inc., Fort Dodge, Iowa.

Then we have Ms. Victoria Calvert, director, Federal Energy Affairs, National Council of Farmer Cooperatives.

We have a vote on the House floor at 4:30. That will require us to leave here periodically.

You have heard the general thrust of the testimony here today. We certainly do not want to deprive any witness of their own special testimony that they would like to give.

In the interest of time you all know of ways in which your testimony might be repetitive of something already said here today, so if you could remember that and proceed as you see fit, we would appreciate it. Go ahead and add the points of emphasis that you would like to add.

You may proceed as you wish.

STATEMENT OF VICTORIA R. CALVERT, DIRECTOR, FEDERAL ENERGY AFFAIRS, NATIONAL COUNCIL OF FARMER COOPERATIVES

Ms. CALVERT. Thank you.

If I might, I would like to lead off because my statement is purposely very brief. I want to give you an idea of the scope of the National Council's involvement in the alcohol fuel.

[The prepared statement of Ms. Calvert follows:]

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TESTIMONY OF

VICTORIA R. CALVERT

DIRECTOR, FEDERAL ENERGY AFFAIRS

NATIONAL COUNCIL OF FARMER COOPERATIVES

My name is Victoria Calvert, and I am Director of Federal Energy Affairs in Energy and Natural Resources for the National Council of Farmer Cooperatives. The National Council appreciates the opportunity to appear before you today. My remarks will be brief and general in nature because Mr. Fogde of Land O'Lakes is here with me and will present more detailed remarks on the proposed National Alcohol Fuels and Farm Commodity Production Act of 1979.

The National Council of Farmer Cooperatives is a trade association representing more than 130 regional farm supply and marketing cooperatives, the 37 farm credit banks, and 30 state cooperative councils. These cooperative organizations are in turn owned by more than 2.5 million farmers. Among our membership are 8 refineries owned by 17 regional cooperatives which have the aggregate production capacity of more than 400,000 barrels per day and which distribute these products to farm consumers in more than 40 states.

For more than three decades, some of our major cooperative members have been involved in trying to work out an economic basis for added markets for grain that alcohol fuels would provide. These cooperatives combine the unique qualifications of farmer-owned and controlled organizations, which not only produce grain and other renewable resources that can be converted to alcohol,

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but are in the fuels business as well.

As a means of providing staff support and technical guidance in the area of Gasohol and related fuels, the National Council has formed a Gasohol Committee to study the short-and long-term potential for alcohol fuels on a national level. In this regard, the Gasohol Committee will be evaluating the costs/benefits of developing alcohol fuels using alternative feedstocks and taking into account such factors as technology, economics and environmental concerns associated with the production and distribution of alcohol fuels. This technical committee provides the expertise for policy recommendations on subjects relating to alcohol fuels which the National Council in turn can elect to endorse.

In general, the member-owners of the farmer cooperatives are supportive of an increased alcohol fuels production program for many of the same reasons that other advocates do. For example, the potential for improved balance of trade resulting from fewer American dollars flowing overseas; the generation of new markets for American farm products; the potential for movement toward U.S. energy independence and the extension of our oil reserves; the reduction of air pollution through use of gasohol in combusion engines, etc.

However, we must add that Government incentives for an alcohol fuels program should be structured to encompass the highly variable needs of all potential producers of alcohol fuels, whether they are small, large, or cooperative. Similarly, they

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must be flexible enough to take into consideration the regional aspects of an alcohol fuels program and must facilitate all potential feedstocks for conversion to alcohol. We believe that an alcohol fuels industry will not be a viable and competitive industry until it can exist without Government subsidies. In this respect, we believe that institution of mandatory use of gasohol at this time would be a costly mistake.

On the other hand, we recognize the importance of Government subsidies and incentives in order to promote the involvement of private industry during this period of technological development. By giving technology a chance, hopefully we can meet the challenge of lowering the production costs of alcohol fuels, and at the same time, provide the net energy balance between Gasohol and natural gasoline which would pave the path toward the implementation of large-scale alcohol fuels production.

We thank you for the opportunity to make these remarks today. While these remarks were brief and in general, we will submit more detailed comments for the record on the National Alcohol Fuels and Farm Commodity Production Act of 1979 at a later date.

Mr. Rose. Thank you, Ms. Calvert.

Mr. Fogde, you may proceed.

(The prepared statement of Mr. Fogde follows:)

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TESTIMONY OF
CLINTON A. FOGDE
PETROLEUM DIVISION PLANNER AND DIRECTOR OF TECHNICAL SERVICES
OF
LAND O'LAKES, INC.

My name is Clinton Fogde. I am the Petroleum Division Planner and Director of Technical Services for the Petroleum Division for Land O'Lakes, Inc.

Land O'Lakes, Inc., is a regional cooperative owned by 225,000 farmers in Iowa, Minnesota, Nebraska, Wisconsin, South Dakota, and North Dakota. Quality Foods and Agricultural Services are the two major divisions of the cooperative. Quality Foods processes and markets such consumer items as butter, cheese, turkeys, eggs, milk, and dairy-related products. Agricultural Services is responsible for supplying the needs of farmers that relate to livestock production, crop production, and the energy needs of the farm.

Land O'Lakes and five other regional cooperatives own an interregional cooperative that is a basic refiner of petroleum products. It is located at McPherson, Kansas, and has a refining capacity of 54,000 barrels per day. Land O'Lakes also along with seven other regional cooperatives owns a petroleum refinery located in East Chicago, Indiana, with a daily refining capacity of 133,000 barrels per day.

One of these refineries has an exploration department. They are very dependent on foreign crude oil to maintain their operations.

Land O'Lakes markets in excess of 200 million gallons per year of refined fuels. In addition, since Land O'Lakes is owned and controlled by farmers who produce grains and other renewable resources such as whey that can be converted to an alcohol, Land O'Lakes is pleased to comment on alcohol fuels.

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Land O'Lakes participated with the Iowa Development Commission in test marketing Gasohol in Iowa. This test was conducted from June 15, 1978, to September 15, 1978, in five different towns in Iowa. Land O'Lakes purchased the alcohol and supplied it to member cooperatives and assisted in the market research and the promotion of the project.

Land O'Lakes has continued to market Gasohol and is currently selling 35 million gallons per year on annualized basis.

I am pleased to offer comments on various aspects of alcohol fuels as you consider H.R. 2153.

Profitability of Producing Fuel Grade Alcohol

Very preliminary studies conducted by Land O'Lakes indicated that by using $2.20 per bushel cost for corn and $1.40 per gallon selling price for ethanol, the following economics have been developed. These numbers are not the result of firm bids or proposals.

Dry Milling - 10 million gallon per year plant is profitable when using $2.20 corn. Each 10¢ per bushel increase reduces profit by 20%, with breakeven at $2.70.

20 million gallon per year plant is profitable when using $2.20 per bushel corn with each 10¢ per bushel increase reducing profit by 16.2%. Breakeven in corn at $2.83.

30 million gallon per year plant is profitable when using $2.20 per bushel corn with each 10¢ per bushel increase reducing profit by 11%. Breakeven is $3.11 per bushel.

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Wet Corn Milling - Larger plants are necessary for wet milling. A 30,000 bushel per day plant is profitable at $2.20 per bushel with breakeven at $2.83. Each 10¢ per bushel increase reduces profit by 16.1%.

New process reduces energy requirements by 30% and additional energy savings can be accomplished by not drying the stillage.

H.R. 2153 calls for corn to be delivered to an alcohol plant for 50% of the established price. This incentive will naturally improve the profitability and probability of producing alcohol. Using corn at $1.25 from the Secretary increases the breakeven point by 95¢ per bushel on dry milling to $3.65, $3.75, and $4.05. The wet milling breakeven moves to $3.78 per bushel.

Many new processes are in the development stage but not currently in commercial use. Gasoline dehydrating, membrane technology, reverse osmosis, and mechanical means of dehydration offer the opportunity to reduce costs in the future. Elimination of purification process equipment and using the ACR dehydrating process can reduce energy requirements by 40% over conventional benzine or ethyl ether processes.

All forms of currently used energy requires energy to make it into a usable form. Ethanol as currently manufactured requires on a percentage basis more energy than refining crude oil or mining coal. New technology, co-generation, and other innovations will reduce this considerably. The largest producer of fermentation ethanol has certified to DOE that it has a very positive energy balance.

Gasohol has provided excellent performance in vehicles from the standpoint of drivability, increased miles per gallon, and lower emissions. The

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April 19, 1979, market study conducted by the Iowa Development Commission reveals an overwhelming response from people surveyed where 20% reported improved auto performance. Significantly only 6% reported no special benefits; 96% rated it outstanding under all weather conditions.

Octane tests performed at one of our refineries and a pipeline company indicate a research octane increase from 4 to 4.5 and a motor octane increase from 2 to 2.5 numbers. There has been a noticeable decrease in engine knock and dieseling when using Gasohol.

The IDC survey indicates that 78% of those who have used Gasohol would use it on a regular basis if it were readily available, while 45% of the non-users would use it if offered at most stations.

Discussions held with Chrysler Corporation indicate a reduction in all engine emissions. They also report a reduction of 70°F in underhood temperature which accounts for some of the increased mileage. Evaporative emissions can be controlled by making the cannisters larger or adding a second cannister.

Concentration of alcohol of more than 10% will perform very satisfactorily in an engine. Changes in materials coming in contact with the fuel will need to be made when using blends of 15% or more. Some carburetor and manifold changes would also be needed. With the cost and limited supply of ethanol, it would seem wise to maintain a 10% blend in the foreseeable future.

Alcohols can be used as the primary fuel for engines very satisfactorily. The principal drawbacks are startability, low mileage, and the requirement for larger fuel tanks.

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Mr. ROSE. Thank you very much.

Let me ask a technical question. What are the processes that are more efficient than distillation?

Mr. FOGDE. Solvent extraction.

Mr. ROSE. Do you put a solvent in the mash?

Mr. FOGDE. Yes. We remove it by solvent or vacuum distillation.

Mr. ROSE. What would the solvent be?

Mr. FOGDE. It would probably be one of our current hydrocarbons, such as hexane or other solvents.

Mr. ROSE. In other words, you run the regular fermentation process?

Mr. FOGDE. Yes.

Mr. ROSE. Then you extract the alcohol by the solvent.

Mr. FOGDE. Yes.

Mr. ROSE. Do you drive it through a column of some sort?

Mr. FOGDE. Yes. We are looking at more mechanical means because of the lower energy requirements, such as membrane technology as Dr. Middaugh suggested.

Mr. ROSE. Does the solvent extraction appear to offer a good recovery method?

Mr. FOGDE. Yes, it does. It is well known because it is currently used in the petroleum industry.

Mr. ROSE. Is it more energy efficient than distillation?

Mr. FOGDE. Yes, it requires less pressure.

Mr. ROSE. I want to thank you both very much. Congressman Bedell.

Mr. BEDELL. First of all, Mr. Fogde, I want to really thank you for the leadership you have shown in this area. It is particularly important because of the knowledge you have of both the technicalities and the industry as well. I hope that I can point out here that even with all the enthusiasm which was exhibited for small plants, I do not think that means that we should ignore large plant research and development as well.

I, for one, would hope we could go both directions at the same time. I think we can do so.

You made the statement that the largest producer of fermentation ethanol certified to DOE it has a very positive balance. Are you quite certain of that statement?

Mr. FOGDE. I have been told by the people at ADM that they were required to certify to DOE their energy balance and that it is positive and they have so certified.

Mr. BEDELL. I think we should get them to certify that to the Energy Department of the Department of Agriculture because their information states that:

> Case I reflects the oil and gas use levels commonly required for present day alcohol distilleries. To pursue this approach would actually increase petroleum imports according to present technology.

We are talking about present technology at ADM. I would hope that we would get that information to the Department of Energy at the Department of Agriculture because it is just one of the many, many cases where I think they have been negative on this matter where they apparently did not have all the facts that they needed to have. Let me thank you again for the work you have done in this area.

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I take it that you also feel that technology is advancing rapidly in this area. For us to say we cannot do it because of the previous plants which have been built a long time ago don't happen to do certain things is of questionable merit. Is that right?

Mr. FOGDE. That is right. I feel we will not manufacture alcohol 5 years from now as we currently manufacture alcohol. It will be a much more efficient method.

Mr. BEDELL. Thank you.

Mr. ROSE. Judge Kelly.

Mr. KELLY. Thank you, Mr. Chairman.

As a practical matter, does it not bother you in any way that the market today is exploding with demand and people are killing one another at the gas pumps and yet we are asking the Government to give incentive to produce the thing that the consumer in this country wants badly? What about that?

The only people who can see the merit of all of this program is the people who want the money from the Government and the people in Congress who want the votes from the people.

All of the rest of the economy cannot see the advantages of this scenario. It is just really you and me who can see the real economic benefits to this situation. Does that not strike you as a little weird?

I do not really feel all that smart. I do not think I know more than everybody else in the United States. I am just a little curious as to the dynamics of this.

Intellectually, how do you and I justify the fact that only you and I can see this?

Mr. FOGDE. I do not feel that way, Mr. Kelly.

Mr. KELLY. Good.

Mr. FOGDE. Let me tell you one of the reasons I don't.

We just had our annual meeting in the latter part of February which was attended by about 4,500 farmers. We have a resolutions committee and every year the resolutions committee offers various resolutions. Then the next year we have to report back on what the corporation did on behalf of those resolutions.

The resolutions committee brought forth a resolution that said that they commended Land O' Lakes Petroleum Department for the fine work they had done in gasohol. This is not very meaningful. This was amended twice from the floor. The final amendment which was voted was that Land O' Lakes would, in fact, build a gasohol plant.

The president of the company contacted me and said that I would go to the board at the next board meeting and tell the board where we stand.

We went to the board and told them what we had done and what our studies showed. They charged us to continue to do this work and by the September board meeting to come to them with either a make or buy decision on alcohol, that is, whether we should build a plant or, if it is more profitable and economical, to buy alcohol from somebody else.

We are in the midst of this study to present to our board so that they can make this decision.

This was overwhelmingly passed at this meeting without one negative vote. We are in gasohol because our farmer-owners want

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us to be. We are competing with other segments of our company for financing.

We have not, as a cooperative or as a company, asked for Government financing. We do not think that morally we could. We are of a size that we are able to finance such ventures ourselves.

Mr. KELLY. Let me interrupt you. We heard here today the testimony of Mr. Crombie that all he needs is $100,000 and he will really do great things for the country. I could not see why he could not pick up $100,000 right here in this room.

Is there anybody within earshot of this globe that would not invest everything they had in a realistic solution to the energy problem? It would be the hottest thing on the face of the earth.

I am sure you do not believe that the oil companies could keep you and me from investing in something that we really thought was a hot deal.

Are the oil companies interfering with your ability to invest?

Mr. FOGDE. The oil companies are not interfering in anyway whatsoever.

Mr. KELLY. What would the oil companies have to do to you to keep you from investing if you thought you could really make a bundle in alcohol? Would they start a riot, or a war, or a revolution?

Ms. CALVERT. The answer is that they would be in the business very quickly.

Mr. KELLY. I think they would be too.

Thank you, Mr. Chairman.

Mr. ROSE. Thank you, Mr. Kelly.

I appreciate the testimony of both of you. Let me say that we will be interested in keeping up with what Land O' Lakes is doing. As you progress we will appreciate it if you will keep us informed.

Mr. DASCHLE. Let me commend these witnesses.

Mr. Kelly seems to be addressing this question. It is a legitimate question. Why is it that private enterprise is not doing what you are asking government to do?

I think there is a legitimate answer to that question, at least in part. It is that we do not know what the profit is going to be. Private enterprise is geared directly to profit. If there is no profit, or if there is no guaranteed prospect of profit, there is little chance that private enterprise immediately will be interested.

I commend Land O' Lakes because with that in mind you still went ahead and did something. I think that is exactly what we should be doing. We should be looking at more than just profit. We should be looking at what the public interest is. Certainly there is a tremendous public interest in gasohol.

In answer to the question that you were asked as to what is it the oil companies can do to you, let me say this. We already know what the oil companies are telling their retailers. Chevron this week has indicated to their retailers that if they so much as talk about retailing gasohol they will pull the Chevron station right out from under them. They will knock down the signs and take away the Chevron franchise. We have heard that already from Phillips 66. We have heard it from Chevron. We have heard it from other oil companies. They control 82 percent of all the franchises in the country.

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I think that this is one thing that we can do. We can produce all the gasohol we want in the country, but if we cannot market that gasohol, and if we cannot put it out throughout the retail outlets that we have right now, then we don't have any ability to use it. We would have to set up a whole new system of retailing.

I think that is the problem.

Let me say this in closing. It takes companies like Land O' Lakes and Cenex and a few of these with the foresight interest and with the public spirit to go ahead even though we do not know what the final dollar sign is going to be on the bottom line. If we had more Land O' Lakes and Cenex's, I think we would have to be far less reliant on government to get some of these things done.

Thank you, Mr. Chairman.

Mr. BEDELL. Will the gentleman yield?

Mr. DASCHLE. Yes.

Mr. BEDELL. Mr. Fogde, are there any fire hazards associated with gasohol above and beyond those in gasoline?

Mr. FOGDE. That question probably should be answered in two ways. One, if you speak to the alcohol itself where it would be stored in a separate container, then it has a boiling point of 175 F. which is relatively high.

If a fire should occur the alcohol is soluble and emissible in water, so it can easily be put out with water.

Contrary to gasoline, as you hit it with water it spreads and causes the fire to go in many different directions.

When you look at gasohol, which is the alcohol blended with the gasoline, you raise the boiling range because the initial boiling point on unleaded gasoline is 60 F. By blending it with 175 F boiling point material, you raise that and reduce the possibility of fire with a blended material.

Mr. BEDELL. Thank you.

Ms. CALVERT. May I make one comment here, Mr. Chairman?

I represent the National Council of Farmer Cooperatives which is a national organization. I don't want to take away from the fine work that Cenex has done, but we have other cooperatives that are deeply involved in this subject. It is the nature of our business to be able to handle not only the technical end of it in research, but the marketing because of the refinery business. In fact, there is marketing in 40 States. We could, and will, and our co-ops do market gasohol in all of their outlets wherever they have it available.

It is this size and type of business that needs to look at all the aspects of it. In fact, that is what we are doing. However, it really goes beyond the concept or the concern of economics. We have to look at the energy efficiency tradefoff which is what Mr. Fogde was talking about. We are committed to having an energy balance that will be at least equal or better than the natural gasoline that we also produce.

I think that is a very big concern, and that is why there has been some dragging of feet in this area, also. There are two things to look at.

Mr. ROSE. Thank you very much.

One of my colleagues and a member of this committee said this morning that he could not be here but that Phillips Petroleum had

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cut off farmland co-ops from diesel fuel today and that he had a few problems on his hands.

Ms. CALVERT. Last Thursday the Department of Energy published a rulemaking, Special Rule No. 9, whereby diesel fuel will be allocated to agricultural production and, in fact, that started immediately. I think farmland will probably be allocated diesel fuel shortly if they are not already. It takes time to get the mandate through the pipelines, I suppose. In fact, that National Council is working on fuel shortages for all of our members. These shortages are heavy.

Mr. ROSE. I want to thank you both very much.

Our next panel is comprised of Mr. William Soleta, Mr. Hodge, Mr. Rasmussen, and Dr. Scheller.

Mr. Soleta is the administrator of the National Gasohol Commission, Lincoln, Nebr.

Mr. Holly Hodge is chairman, Agricultural Products Industrial Utilization Committee, Lincoln, Nebr.

Mr. Ross Rasmussen is with the National Gasohol Commission.

Dr. William A. Scheller is professor of chemical engineering at the University of Nebraska in Lincoln.

I believe we also have State Senator Harold Dover of Montana.

We welcome all of you.

Mr. HODGE. Mr. Soleta was not able to make it today because of complications in plane reservations. I understand that he is trying to be scheduled for tomorrow to testify.

Mr. ROSE. All right. That is fine.

Please proceed, Mr. Hodge.

[The prepared statement of Mr. Hodge follows:]

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STATEMENT BY HOLLY HODGE, PRESIDENT
OF THE NATIONAL GASOHOL COMMISSION, INC.
BEFORE THE HOUSE AGRICULTURE SUBCOMMITTEE

MAY 15, 1979

I am Holly Hodge, President of the National Gasohol Commission. I appreciate the opportunity to appear at this public hearing of the House Agriculture Subcommittee to discuss "The National Alcohol Fuels and Farm Commodity Production Act of 1979" -- H.R. 3905.

I am representing the members of the National Gasohol Commission in support of this bill. The National Gasohol Commission was officially formed here in Washington, D.C. on June 14 1978, the headquarters being located in Lincoln Nebraska The purpose of the Commission, as stated in its Articles of Incorporation, are to encourage the use of agriculturally derived alcohol blended fuels as a viable energy source by (a) developing, accumulating and disseminating information concerning alcohol blended fuels and (b) exploring, analyzing and coordinating federal and state legislative and administrative policies programs and procedures to maximize the use of alcohol blended fuels There are presently thirty-three states belonging to the National Gasohol Commission.

The members of the National Gasohol Commission have passed many resolutions in support of the Gasohol program which would bring about the establishment of a large scale Gasohol program throughout the United States. Those Resolutions can be generally summarized into a four point program which is as follows:

1. That the Federal Government establish a Loan Guarantee Program whereby each State shall be eligible to receive up to a 20 million dollar federal loan guarantee to assist private industry in securing financing to build an alcohol plant in each state. These alcohol plants shall utilize each states' agricultural raw materials for the production of alcohol fuels.

2. That the Federal Government should change the present law to extend the four cent excise tax credit for Gasohol purchases beyond the 1984 deadline. Also State Governments should pass legislation to establish state credits on Gasohol to justify the economics of utilizing whatever raw material that state may have to convert into alcohol fuels.

3. That the Federal Government finance construction of strategically located alcohol storage facilities for national security purposes and also require that federal vehicles use Gasohol where available.

4. That the State and Federal Governments appropriate a significant amount of money for the continued research into the conversion of agriculturally derived biomass materials for alcohol fuels.

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The members of the National Gasohol Commission also passed resolutions supporting the National Alcohol Fuels and Farm Commodity Act of 1979. They resolved that surplus grain in the Federal Three Year Reserve Program and Federal Farm Program Set-Aside Acres be used to produce grain for conversion into alcohol fuels.

The State Legislatures are already supporting the Gasohol Program to a great degree. There has been state Gasohol legislation introduced or passed in twenty-seven states. By-in-large this legislation: establishes State Gasohol Commissions, provides monies for Gasohol research, provides tax credits for Gasohol consumption, provides money to build pilot alcohol plants and facilities.

The support for the Gasohol Program is expanding rapidly throughout the United States. Gasohol is presently being sold in over 600 filling stations in the United States. Most of the alcohol for the Gasohol program is now produced by Archer Daniel Midlands, Inc. of Decatur, Illinois. The demand for Gasohol is far exceeding the production of alcohol for Gasohol, at the present time. The requests for production and marketing information on Gasohol to the office of the National Gasohol Commission has increased tremendously since the Commission was formed eleven months ago. They have tripled their work force and have utilized volunteer groups to assist in the mailing of Gasohol informational packets throughout the United States There are large and small alcohol plants being considered for construction in many areas There is much research being conducted on the production and marketing of alcohol fuels and its by-products. In spite of all the Gasohol activity throughout the United States, there is still a definite need for Federal Legislation to the extent that is contained in H.R. 3905.

The strongest support for H.R. 3905 by the members of the National Gasohol Commission is in the section providing for Federal Loan Guarantees to assist private industry in securing financing to build the alcohol plants.

The members of the National Gasohol Commission were disappointed in the manner in which the Secretary of Agriculture selected the recipients of the Federal Loan Guarantees to build hydrocarbon or alcohol plants under the Agriculture Act of 1977. It is the opinion of the members of the National Gasohol Commission that Secretary of Agriculture Bergland purposely avoided selecting final applicants for federal loan guarantees, under the Agriculture Act of 1977, who might produce alcohol for Gasohol use. Therefore the members of the National Gasohol Commission believe the original intent of the Legislation was not carried out by the Secretary of Agriculture We recommend that the Congress write into H.R. 3905, language that will leave no administrative doubt as to the intent of Congress in carrying out the responsibilities of this bill In the light of the present energy crisis we would suggest that this joint agriculture committee include in H.R. 3905, rigid time frames in which the Secretary of Agriculture has to administer the Bill. We recommend that the Secretary of Agriculture be instructed in the language of H.R. 3905 to give special consideration to applicants for Federal Loan Guarantees from states with large surplus agriculture products in storage. Many states have large amounts of grain in the Federal three year grain reserve. This supply indicates a problem in marketing this excess grain in terms of price or transportation. The Secretary of Agricul-

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ture should give immediate consideration to this problem by issuing Federal Loan Guarantees allowing alcohol plants to be built in those states to utilize those surplus agriculture commodities as soon as possible.

I have personally worked with the Gasohol Program since 1971. I was appointed to the Nebraska Agriculture Products Committee by the Governor of Nebraska in 1971 and have served on that committee continuously since that date. I was also elected as the first President of the National Gasohol Commission here in Washington, D.C. eleven months ago. I must say that when I read the provisions contained in H.R. 3905, I regarded the Bill as filling many of the overall needs of the Gasohol Program. H.R. 3905 has incorporated into one bill, many solutions to problems of the Gasohol Program that we have been endeavoring to solve individually for some time.

Those solutions are as follows:

- utilizing surplus agricultural products into fuel
- utilizing agriculture set-aside acres to produce energy crops
- providing federal loan guarantees to assist the financing of alcohol plants
- providing a guaranteed raw material supply to the alcohol plants
- providing a market for the by-products of alcohol production

I recommend that this combined House Agriculture Subcommittee pass H.R. 3905 to the House Floor with the improved language that I have suggested.

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STATEMENT OF WILLIAM A. SCHELLER, PROFESSOR OF CHEMICAL ENGINEERING, UNIVERSITY OF NEBRASKA, LINCOLN, NEBR.

Mr. SCHELLER. Mr. Chairman, Mr. Fithian, and Mr. Bedell, and Mr. Daschle, my name is Dr. William A. Scheller. I am professor of chemical engineering at the University of Nebraska.

I have served as technical advisor to the Nebraska Ag Products Industrial Utilization Committee, the Gasohol Committee, since its formation 8 years ago, and I am a director of the National Gasohol Commission.

I have also published and presented over 25 papers on various aspects of grain alcohol production, upgrading of distillers grains—a byproduct of grain alcohol production—properties and performance of gasohol fuel, and related topics. I am submitting a set of selected reports on topics pertinent to H.R. 3905 for inclusion in the record of this hearing.

The production of grain alcohol while requiring specialized knowledge is a straightforward process known for over 4,000 years. The technology for conversion of starch to sugar by certain enzymes and the conversion of sugar to grain alcohol by yeast cells is well established. For the past 30 years the utilization of fermentation grain alcohol has been limited to beverage and medicinal purposes.

As a result the plants that were built in those years produce a highly purified, potable product. Such high purity is not needed for a fuel grade of alcohol and a byproduct known as fusel oil containing higher molecular weight alcohols should not be removed from the fuel grade alcohol as it is in potable and industrial ethanol. By eliminating this purification the cost and energy requirements for grain alcohol production are reduced substantially.

Existing alcohol plants, except the ADM plant at Decatur, Ill., were built at a time when energy was very cheap. Under those economic conditions there was no incentive for heat recovery in the alcohol plant and energy consumption per gallon of alcohol was relatively high. With today's high energy cost and with emphasis on conservation, heat recovery equipment is economically justified in a grain alcohol plant. Engineering designs have been prepared and plants are actually operating in Europe with fossil fuel energy consumptions that are lower than the energy content of the alcohol produced. Today it is a fact that grain alcohol can be produced at an energy level which introduces new energy into the economy, that is, the energy content of the alcohol produced is greater than the fossil fuel energy consumed in producing the alcohol. ADM is to be commended for their bold and aggressive actions in the area of efficient conversion of corn to feed products and ethanol. Don't be misled by Agricultural Secretary Williams into thinking that this complex system is a requirement for energy efficiency. A simple distillery producing ethanol from distillers dried grains can also have a net energy production.

The exact amount of net energy produced is an economic consideration in which increased capital investment must be balanced against decreased operating cost. Other advances such as the replacement of batch fermentation with continuous fermentation can

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also improve the economics and energy relationships in fermentation alcohol production.

The cost of producing grain alcohol will depend on the size of the plant as well as energy cost, labor cost, grain cost, interest rates, et cetera. Generally, the larger plants can produce alcohol at a lower unit cost because fixed expenses are distributed over a larger production base.

For example, in a 20-million-gallon-per-year grain alcohol plant with a certain assumed set of grain, byproduct, labor and energy prices, anhydrous alcohol can be produced with a 15-percent rate of return based on net cash flow for about 95 cents per gallon.

In a 50-million-gallon-per-year plant with the same cost basis and the same 15 percent rate of return the alcohol would be 83 cents per gallon. An even lower alcohol price would result from production in a 100-million-gallon-per-year plant. Again, I remind the hearing that for the greatest economy a fuel grade of ethanol be produced for gasohol rather than a beverage or chemical quality alcohol.

The principal byproduct that results from grain alcohol production is cattle feed known as distillers grains. They can be produced as two basic types: one with soluble components included, the other with the soluble components concentrated or dried separately from the distillers grains. These byproducts are not limited in use to feeding beef cattle but can also be used in the feed rations for dairy cattle, sheep, swine, and poultry.

A great deal of information has been published on the nutritional value of distillers grains for beef cattle and dairy cattle. An excellent source of information is the collection of the proceedings from the annual meetings of the Distillers Feed Research Council. These technical meetings have been held each year for over 30 years. Research results have been reported which show that cattle receiving distillers grains are more productive. Beef cattle gain additional weight and dairy cattle produce additional milk.

The quality of the protein contained in the distillers grains is comparable to that in soybean meal although it is present in a somewhat lower concentration—44 percent in soybean versus 30 percent in corn distillers grains. Xerox copies of two papers reporting tests on distillers grains with beef cattle and dairy cattle are submitted here for the record.

I think, as an off-hand remark, that when USDA reports back to this committee with some information on the value of distillers dried grains, you should insure that these 30 years of proceedings from the Distillers Feed Research Council has been one of the reference sources that USDA has used in providing this information to you.

There has been concern expressed by some that an increase in production of distillers grains will reduce the demand for soybean meal. However, one should also point out that land for producing soybeans and land for producing corn is basically interchangeable. This means that if indeed there is a reduced demand for soybean meal, then the soybean land can be planted in corn, and or grain sorghum, providing more feed for the alcohol plants.

At the University of Nebraska we have under development an integrated process for a grain alcohol plant which provides: One, a

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protein concentrate suitable for human consumption; two, an increase in ethanol yield of 10 to 15 percent; and three, the production of higher molecular weight alcohol such as butanol.

In addition, we produced distillers dried grains but at a reduced yield from what is found in a simple plant. The distillers dried grains and solubles, however, is of comparable quality to that that is normally produced in a grain alcohol plant.

Nebraska has studied the performance of a blend of 10 percent anhydrous grain alcohol in 90 percent unleaded gasoline extensively in its 2 million mile road test program. Compared to unleaded gasoline the octane number of gasohol is higher, vehicles run more smoothly, and the typical unleaded dieseling is reduced or eliminated. Total emissions are reduced and gas economy is increased by about 5 percent based on miles per gallon and about 9 percent based on miles per Btu.

The Department of Energy report, which will be presented at an international alcohol fuels symposium in 2 weeks, will show an increase of three road octane numbers for gasohol fuel. This is in agreement with the test data which we presented over 1 year ago and which DOE disputed.

Percentages greater than 10 percent ethanol can be used without engine modification probably up to levels as high as 25 percent. Ten percent was chosen by Nebraska as the basis for gasohol consumption because laboratory studies indicated that optimum fuel economy was achieved in the range of 10 to 15 percent ethanol. We believe that the quality of unleaded fuel in the Nation can be improved more efficiently through the addition of grain alcohol than through mroe severe refining in the oil refinery.

The technology for commercial grain alcohol production is here today. If the money is available, design and plant construction can be initiated immediately. This cannot be said for coal liquification, coal gasification, or shale oil production. It requires approximately 2 years to design and construct a large grain alcohol plant. With the current potential in our Nation of producing 4 billion gallons of grain alcohol from available surplus grain and energy crops which could be grown on set-aside lands, we would need 40 plants capable of producing 100 million gallons per year each—for double that number of plants if they were designed to produce 50 million galons per year each.

If eight new plants were started each year then in 2 years 800 million gallons of fuel ethanol capacity would come on stream and each succeeding year an additional 800 million gallons of capacity would begin operation until the total production capacity of 4 billion gallons per year was achieved after an elapsed time of 7 to 8 years. The total capital investment for such a program would be in the order of $4 to $5 billion.

A few months ago I was called to Brazilia in the country of Brazil by President Figuerato to discuss the Brazilian gasohol program with him.

In 1978 Brazil produced 780 million gallons of ethanol. In 1979 they will produce over 1 billion gallons of ethanol for fuel purposes. At the present time they have a level of about 14 percent alcohol on the average in the fuel in the country of Brazil. Brazil has a land area comparable to that of the United States. They have

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STATEMENT OF HAROLD DOVER, STATE SENATOR, STATE OF MONTANA

Mr. DOVER. Thank you, Mr. Chairman.

I have a prepared statement. However, I would like to depart from it and emphasize some of it. I would like to make some other statements to address some of the questions that came up today.

I sponsored the first gasohol bill that passed in our legislature in the State of Montana and several gasohol bills since then. I have worked with the National Gasohol Council since its inception, and I am a member of its executive committee.

I was with the WIFE convoy when they came back here. We drove a pickup using 20 percent of ethanol, so we have had a lot of experience with ethanol. I want to say that it really works.

I count it a real privilege to be here today and testify in behalf of this House bill, H.R. 3905. I am certainly supportive of it.

I certainly want to commend Congressman Bedell for doing something like this because it is something that is long overdue. As a legislator and working along that line, I know how hard it is to get it going, and I surely appreciate what you have done.

The question has come up why is it the Government, and the people who are sitting here today, are the ones who are addressing the problem and have to come up with the finances to build these gasohol plants.

I want to tell you that the people are assured that gasohol is necessary and that it will work. Even when we came back 2 years ago in the gasohol convoy we had our CB's working and we were constantly talking to people along the way. Their question was "How soon can you get it for us?" Of course, since then the interest in it has grown tremendously, and we are constantly being contacted regarding the starting of a plant and how soon we could get it going.

So, the question comes of why don't we have these plants going?

I think the question comes back to the fact that the investors need a signal from the Federal Government that it will, in fact, support the gasohol program. The reason that I say this is because the Department of Agriculture controls, to a large degree, the crops that we are going to depend on for this gasohol. The Department of Energy has control of the energy. We have the EPA standards, and we could go on and on with the departments that affect this type of program.

I think we have to admit that many of these departments have been very negative. In fact, just this last week in our rural area—and I am from a rural area—we heard over our radio, and I have been reminded constantly, that the Department of Agriculture has come out and told us that they cannot justify using fuel for food because we will be taking food out of the mouths of the hungry. This puts a question in the minds of especially the investors and the different people as to whether this is something that the Government, which has a large control of our crops, will go along with and whether we should invest in it.

Because of this, I think the Government departments are going to have to make a strong overture to indicate to the people that they are, in fact, and especially the investors, going to support this program. I think we are not out of order in this sense to ask for

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these type of overtures. This includes the Federal loan supports, the 20 percent such as was talked about this morning on the depreciation, and the continuation of the 4 cent tax relief on the gas tax, and other areas. This is the type of thing that we are going to have to have to compensate for the adverse comments that we keep getting on the radio and television out in our areas.

I also believe that these loans and incentives can be justified because gasohol will lessen our dependence on foreign oil and will help us in our balance of trade by cutting back on the imports of foreign crude and also, I believe, it will increase our exports of food by-products.

This is something we will have to develop, I am sure.

I live in a wheat and barley country. We have a tremendous opportunity for byproducts here of human consumption. Already, even though we are just talking about building plants, we have been confronted by people from Japan and South Korea and Taiwan to pick up all of the DDG's to be exported to foreign countries.

So, they see a real need for this.

I would like to see us develop that in our country as a food product for human consumption for our own people because it is more nutritional. I think we could also sell it to those people and do them more good than what we have done.

We also support the concept of using grain reserve and the set-aside acreage for fuel. However, I feel that we need to proceed with caution.

Releasing the set-aside acreage may be a little premature because of the limited number of plants in existence today and because of the time that it takes to build plants.

This depends on how many of these small plants begin to go into action. The big plants, of course, would take two to three years.

Furthermore, I think that this may be a little bit too early to set a date for grain prices for 1982.

I think the Secretary of Agriculture should be able to adjust the set-aside acreage from year to year and take into consideration the needed surplus for food and for fuel for that year. It seems that this is something they could handle in that Department.

Also we question the advisability and the necessity of involving the Secretary of Agriculture in purchasing the grains for the plants and controlling the distribution and marketing of the DDGS. This can be adjusted and it can be provided for by freeing up set-aside acreage for production of food and fuel.

The added production and the development of better nutritional food from these byproducts will feed our American people and also open up foreign markets for both the new processed foods, which I think we are going to find develop out of taking the starch out of this, and also just exporting the raw material itself—the raw DDGS.

I might also point out that there is a definite interest on the State level for gasohol. We had four gasohol bills in our legislature this session. One of them cut State gas tax 7 cents a gallon and lowered the property tax and also the inventory in and out as much as 5 percent.

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It added an initial check-off of a quarter of a cent to the wheat and barley which set up a fund of $200,000 a year. We are working on the developing and marketing of the byproducts.

All of these bills passed with almost unanimous consent in both the House and the Senate.

I have also been informed that there are 27 other States which have introduced legislation or passed legislation that is gasohol related. So, I think you see a very definite interest in the grass roots starting with the people in the States and working on up here to the Federal level.

Congressman Bedell, I am looking over this bill for wheat and I cannot find it. I hope you do not forget us people out in the wheat country. I think one of the big things that we can contribute is the byproduct from the wheat and barley as well as the ethanol.

In Montana we are working on a barley syrup, for example, that the candy companies and some of the others are very interested in because you can use it for candy that does not stick to your fingers.

There is the talk about large and small plants. I think we need both. One advantage of the small plants is that we can get them now. This can provide energy for the farm which uses a lot of the energy. These farmers need energy right now. In fact, some of them are getting in desperate straits as to how they are going to get their crops in. If they do not have the fuel at the time when they need it, it can be very costly and they can lose all of their investment at that point.

So, it is very important. This is one area where I think we can help our country and especially our farmers right now. That is with the small plants.

However, there is a definite need for the large plants because these are the plants that are going to provide the fuel for our urban cousins.

The small farmer with the small plant can take care of himself and maybe a small rural area, but when it comes to the large urban areas, we are going to have the large plants.

Also, the large plant is going to be necessary to be able to use the byproduct for the food processing for human consumption. So, I very definitely feel that there is a need for both and this needs to be taken into consideration.

I appreciate your time and efforts, and I certainly hope you support H.R. 3905.

Mr. ROSE. Without objection, we will insert your entire prepared statement in the record.

[The prepared statement of Mr. Dover follows:]

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TESTIMONY OF

HAROLD DOVER
STATE SENATOR
STATE OF MONTANA

BEFORE THE

JOINT HEARINGS OF THE SUBCOMMITTEES ON
DEPARTMENT INVESTIGATIONS, OVERSIGHT, AND RESEARCH
CONSERVATION AND CREDIT
LIVESTOCK AND GRAINS

OF THE

U. S. HOUSE AGRICULTURE COMMITTEE
WASHINGTON, D. C.

May 15, 1979

I am Senator Harold Dover, a legislator from Montana. I sponsored the first gasohol bill to pass the legislature in Montana and several gasohol bills since then. I have worked with the National Gasohol Council since its inception and am a member of its executive committee. I appreciate the opportunity to appear at this public hearing of the House Agricultural Subcommittee to discuss "The National Alcohol Fuels and Farm Commodity Production Act of 1979," H. R. 3905.

We want to commend Congressman Bedell for sponsoring this bill. This bill is certainly supportive of the gasohol program and what it can do through the agricultural segment of our country to stop run-away energy costs and still provide low-cost food both domestically and to the hungry of the world. This kind of legislation is long overdue.

We support the Federal loan guarantee to finance building the plants. The demand for gasohol today far exceeds the supply, but the private sector needs financial backing and tax incentives to encourage them to invest the amount of money necessary for these plants. The people are assured that gasohol is necessary and will work, but the investors need a signal from the Federal government that it will in fact support the gasohol program. In our rural areas, we hear statements from heads of the Department of Agriculture such as they don't think grain crops should be used for fuel and take food out of the mouths of the hungry, that it isn't energy-efficient and too costly.

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All of these statements have been properly addressed and answered by the fact that the protein and gluten, the food that hungry people need, is retained and possibly improved in the process The increased production of agricultural products to provide fuel can actually provide more nutritious food. The energy efficiency has been brought into line by new technology The cost of the ethanol has been adjusted by new technology, the increase in the cost of fossil fuel and better mileage, engine wear and performance of the vehicle. But this continuous barrage of questionable statements from the Department breeds a distrust in the Department's stand on gasohol and an uneasiness to go ahead and invest the amount of money needed to build the plants This pessimistic attitude of the Department needs to be compensated for by incentive programs, Federally-guaranteed loans and assurance farmers will be allowed and encouraged to plant crops for fuel.

These loans and incentives can be justified because gasohol can lessen our dependence on foreign oil, help us with our balance of trade by cutting back on our imports of foreign crude oil and increasing exports of the food by-products (gluten and high protein food substitutes). As the use of ethanol increases, the need for the farmer to depend on government loans for grains, set-aside acreage and other farm programs will become unnecessary and thus less costly to the taxpayer. Furthermore, this will provide much needed fuel, more employment, and more self-sufficiency for our Nation s people.

We support the concept of using the grain reserve and set-aside acreage for fuel however we must proceed with caution. Releasing the set-aside acreage may be a little premature because of the limited number of plants and the time it takes to get new ones into production. Furthermore this may be too early a date to be setting grain prices for 1982 The Secretary of Agriculture should be able to adjust the set-aside acreage from year to year to take into consideration the needed surplus for food and fuel for that year.

We question the advisability and necessity of involving the Secretary of Agriculture in purchasing the grains for the plants and controlling the distribution and marketing of the DDGS. This can be adjusted and provided for by freeing up set-aside acreage for production of food and fuel. The added production and the development of better nutritional food from the by-products will feed our American people and open up new foreign markets for both the new processed high nutritional food substitutes and the unprocessed DDGS Japan, Taiwan and South Korea have already been contacting proposed plant sites for all their DDGS.

In summation, I want to again thank Congressman Bedell for sponsoring this bill and emphasize the point that through gasohol the farmer can provide enough fuel to supply the needed supplements to our fossil fuel supplies. He can bring greater security and tranquility to our Nation and, in the process, provide more and better food products for our people and the people of the world.

I urge your passage of H. R. 3905 to the House floor with the suggested changes.

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Mr. ROSE. Thank you.

Mr. Bedell?

Mr. BEDELL. Dr. Scheller, you indicated that the DDG could be used for sheep, swine, dairy cattle, and poultry. Do you have it documented?

Mr. SCHELLER. Yes, you will find in the proceedings of the Distillers Feed Research Council reference to the use of this material for all of these animals. The feed rations, for example, for hogs and for poultry, if you read the composition label, you will find distillers dried grains included in those rations.

I do not have detailed information at my fingertips on matters such as weight gain and so forth. However, I do know that distillers dried grains fed to chickens produces a good rich, yellow yolk, in the egg.

Mr. BEDELL. Let me read to you from the testimony from the Department of Agriculture.

The high fiber content of DDG limits its acceptability for the poultry and swine markets which between them account for over half of the total domestic high protein feed supplement consumption. The fiber fills poultry stomachs and the birds stop eating before their nutritional and growth requirements have been satisfied. This cuts production. Swine are also unable to digest the fiber.

I do not know who is right or wrong.

Mr. SCHELLER. It is a feed component and it has to be used in the right concentration as it also has to be used in the right concentration for beef cattle and dairy cattle.

I would suggest that we could get some expert information on this from some of the feed companies such as Ralston-Purina, for example.

Mr. BEDELL. Would you be in a position to do that? Excuse me, I yield to Mr. Fithian.

Mr. FITHIAN. I thank the gentleman for yielding. I wonder about this argument. They say it is a threat to soybean meal, et cetera. On the other hand they say it cannot be used for feed. Can you comment on that?

Mr. SCHELLER. If it cannot be used as feed, then it is really not a threat, is it? [Laughter.]

But I think that the testing that has been done that it is a suitable feed component. I have to stress that. You cannot feed the animal only distillers dried grains. It is a component in a feed ration.

Mr. BEDELL. I don't think anybody is proposing anything different than that. However, my understanding is that the University of Nebraska has done a great deal of work in this regard.

Mr. SCHELLER. Work has been done in the area of feeding beef cattle and dairy cattle with distillers dried grain, yes.

Mr. BEDELL. Could you see if you could get information on that. I think the committee would like to have it.

Mr. SCHELLER. Certainly. I will be happy to.

Mr. BEDELL. Finally, let me say this. I believe somebody from the University of Nebraska—I am not sure whether it was you or not—told me that they felt that the DDG, although it has less protein than soybean meal, because of its unique characteristic somehow it bypasses certain stages and it actually pound-for-pound is comparable in feed value.

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Mr. SCHELLER. Protein contained in the DDG is as good or better than the protein contained in the soybean meal. It is present in lower concentrations—30 percent rather than 44 percent—but the quality of the protein itself is at least as good or better. This was the result of research done by Prof. Terry Klopfenstein in the Department of Animal Nutrition.

Mr. BEDELL. Thank you very much. Thank you, Mr. Chairman.

Mr. ROSE. Mr. Fithian.

Mr. FITHIAN. Thank you, Mr. Chairman.

I want to thank Dr. Scheller for his kind cooperation on some other efforts I have made in this area and for some efforts I made years ago. Let me pursue two aspects of your testimony.

First of all, are you familiar with Dr. Tsao's work?

Mr. SCHELLER. Yes, I am.

Mr. FITHIAN. That was for my own enlightenment.

Your cost figures have been contested by some, as I am sure you know.

Mr. SCHELLER. Oh, yes.

Mr. FITHIAN. Could you for my benefit break down or amplify in any way, or explain in any way your paragraph at the top of page 2 as to those costs or how you arrived at them.

Mr. SCHELLER. The 83 cents and the 95 cents?

Mr. FITHIAN. The 20-million-gallon figure also, and the rest of that paragraph.

Mr. SCHELLER. The cost components that we would have, of course, would be the cost of the grain per gallon of alcohol and at that point I like to deduct the income per gallon of alcohol from selling the byproduct. This is part of the overall balance sheet, but that difference I refer to as the net grain cost. That is the cost to the alcohol plant for the starch.

Incidentally, this is less sensitive to grain price than one might expect because as the price of the feed grain goes up the value of the byproduct also goes up and the difference is therefore not as sensitive to the changes as one might expect.

So, the net grain price is one component. What we call the conversion cost is the next component. The conversion cost contains the cost of utilities, labor, maintenance, supervision, overhead, property taxes, and insurance.

Mr. FITHIAN. Does this include drying?

Mr. SCHELLER. Yes, it does. So we have the net grain cost and the conversion cost.

Then we have the depreciation of the plant which becomes a cost item and the taxes, corporation taxes, which become a cost item. Then there is a profit or the return on investment which becomes another component.

I don't have in my head the detailed results here but with coal as an energy source the conversion cost is about 30 cents per gallon or less, depending on how much heat recovery we put into the alcohol plant.

The net grain cost might run 35 cents a gallon. That gets us up to 65 cents a gallon. The depreciation is 15 cents. That gets us up to 80 cents per gallon. The rate of return will then make up the balance, give or take a few pennies.

Mr. FITHIAN. Thank you.

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I yield to Mr. Bedell.

Mr. BEDELL. That corresponds accurately with figures that we were given by the Department of Agriculture. We were given the figures of the net grain cost. I think it came out about exactly to 35 cents from what they had learned from ADM. Their figures show 33 cents compared to your 30 cents for the conversion costs. We have a great difference in capital recovery according to what they showed.

Mr. SCHELLER. Yes. It depends on what the depreciation time is. If they are able to use a double declining balance, then they would have a substantially higher figure in there at the present time for depreciation.

Mr. FITHIAN. Let me ask this. Have you had any experience in experimentation or even calculation, or have any of your feed scientists worked on a system of conversion which is tied to a feeding operation, that is, feeding the distillers grain wet without going through a drying process.

Mr. SCHELLER. In a large plant I think this would be a very difficult arrangement to conduct. You might be able to be in a position to supply wet distillers grain for a part of the time, but certainly from the investment standpoint, if it were my plant, I would want to have the capacity to dry, that is, the ability to dry all the grains that were produced in the event of flood or blizzard or anything that would block off my delivery of wet grains. It would have to be looked at on an individual case-by-case basis.

Mr. FITHIAN. What do you figure the cost, both in terms of dollars and in terms of energy ratio, of drying the distillers grain?

Mr. SCHELLER. Here again we get into a question of capital investment versus operating cost. I can swap operating cost for capital investment by putting in additional heat recovery facilities.

In terms of what it takes to dry these grains, it might range anywhere from 60,000 Btu's per gallon of alcohol with little or no heat recovered down to 20-some thousand with a good deal of heat recovery in the system.

If energy is worth, as Western coal delivered in Western Nebraska is, on the order of a dollar and a half per million Btu's, we can take 60,000 and divide by a million and multiply by 150 cents and that is going to come out around 9 cents, isn't it, per gallon of alcohol.

Mr. FITHIAN. I did not do too well in mathematics.

Mr. ROSE. We are not doing very well on time, either, gentlemen.

I want to thank the entire panel for an excellent presentation. I am sure you will be hearing from us again on this important subject.

Our last witness is Mr. Werner Muller, U.S. Industrial Chemical Co. Division of National Distillers and Chemical Corp.

Mr. Muller, please proceed.

STATEMENT OF WERNER C. MULLER, VICE PRESIDENT, U.S. INDUSTRIAL CHEMICALS CO., DIVISION OF NATIONAL DISTILLERS AND CHEMICAL CORP.

Mr. MULLER. Thank you, Mr. Chairman.

My name is Werner C. Muller. I am vice president of the U.S. Industrial Chemicals Co., a division of National Distillers and

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Chemical Corp. My career with National Distillers has been based primarily in process engineering. I have been in charge of process engineering for approximately 25 years.

I have a prepared statement which is two pages long, double-spaced, and I believe the quickest way to introduce the testimony is for me to read it into the record.

Mr. ROSE. Please proceed as you wish.

Mr. MULLER. National Distillers and Chemical Corp., hereinafter referred to as "National", through its National Distillers Products Co. and U.S. Industrial Chemicals Co. divisions, has been engaged in the manufacture and sale of beverage and industrial alcohol manufactured by fermentation from grain and molasses, and synthetically from ethylene over a period of more than 70 years. National is one of the principal factors in the industrial alcohol business and has, perhaps, the largest capacity for the manufacture of anhydrous alcohol (approximately 40 million gallons per year) in the United States. For the past 30 years, National has designed and engineered its own alcohol production distillation facilities using its own processes, and is well qualified to evaluate the economics and feasibility of ethyl alcohol manufactured from biomass.

National's management established a program approximately 2 years ago to investigate the use of biomass materials, principally carbohydrates—sugar, starch, and cellulose—for the manufacture of chemicals and fuel. National also established a program to investigate genetic engineering and microbiology in the development of this technology.

The Brazilian Government has made a commitment to substitute alcohol for gasoline as a motor fuel, and inasmuch as National has business interests in Brazil, it became engaged in a project to develop the most modern and efficient process for the manufacture of alcohol from biomass in Brazil. National's background and experience in the manufacture and use of ethyl alcohol for chemicals and fuel leads to a similar interest in the U.S. gasohol program.

The use of corn as a feedstock to manufacture alcohol for the gasohol program appears to be appropriate as an initial introduction to the ultimate development of a broader fuel and chemical biomass program. The value of this program can only be realized if it results in an economic reduction of imported petroleum, which ultimately means the reduction of the use of petroleum in general.

At the present time, it is National's intent to use its expertise in the further development of the technology for the manufacture of alcohol from carbohydrates, provided it is economically feasible.

National believes that corn, either normal No. 2 grade yellow commercial or off-quality, is a suitable raw material if it is supported initially by Government subsidies and if its use is consistent with the supply demand balance for byproducts and high protein animal feed and the overall agriculture balance. Ultimately, the program must provide an economic incentive to industry to improve the technology for conversion of biomass to alcohol using more abundant and less expensive feedstocks, such as municipal wastes, cellulose residues, food processing wastes, and specifically grown sugar, starch, or cellulosic biomass. This technology appears to be entirely feasible and could lead to an economically self-

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supporting program, that would also serve as a solution to some ecological problems.

Concern for both the technology by which alcohol can be efficiently manufactured from corn and the overall energy balance—that is, fuel value output divided by fossil fuel energy input—have been important considerations in National's approach to the manufacture of alcohol from biomass for fuel purposes.

The gasohol program raises many questions, such as processes, energy balances, technology improvements, land bank effects, the performance of alcohol in internal combustion engines, and the effect of Government incentives on the acceleration of the solution of the automobile fuel problem by industry. These questions can be best answered by discussion, which we should be pleased to accommodate.

Let me add a statement. We have spent a considerable effort working with this problem in Brazil and a considerable amount of time and money in technical experimental work in our laboratories in Cincinnati, Ohio, and also with a company in Berkeley, Calif. where we are investigating the improvement of microorganisms by genetic engineering techniques.

We had rather late notice to the hearing today, so I do not have any further preparation; however, I should be pleased to answer any questions.

Mr. ROSE. Tell me what you are doing in genetic manipulation. What appears to be possible?

Mr. MULLER. Yes, Mr. Chairman. The approach we are using to deal with this problem is to go back to the whole fermentation process. Actually, the technology that is used today is essentially technology that has been used for the past 50 years. We started with all the problems and limitations of the existing technology such as: One, handling large quantities of water which must be heated, cooled and evaporated and requires large quantities of energy; two, the efficient conversion of starch to sugar which requires energy for cooking uses enzymes for saccharification; three, batch fermentation which normally requires a 72-hour cycle; four, production of anhydrous alcohol which requires distillation to produce 190-proof alcohol and a second distillation to produce anhydrous alcohol; five, the disposal of the waste stillage products which requires removal and treatment of large quantities of water to recover the protein feed values.

In order to optimize these systems, we are studying higher alcohol concentrations in continuous fermentation and higher fermentation temperatures.

We designed more efficient distillation facilities to reduce the energy requirement.

We have started a program to improve the use of microorganisms and enzymes for conversion of the starch to sugar and to find organisms that would permit the use of higher temperatures and higher alcohol concentrations.

We are still involved in that program, but we are making considerable progress.

Genetically, we have begun to use the cell fusion technique on yeast cells; that is, providing an environment which will cause two cells to join together genetically to combine the properties of the

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two cells. This program is too recent to have produced any meaningful results.

Mr. ROSE. Are you aware of any advancements or have any advancements taken place in genetic manipulation?

Mr. MULLER. Of anything?

Mr. ROSE. To help the fermentation process.

I was at the Pasteur Institute in Paris about a month ago. They have a rather interesting history with the fermentation process. I am curious if work that has been done in cloning and the DNA work, or in any laboratories around the world, if there has been an application by anybody which has been directed toward making a more efficient process for converting certain substances.

Mr. MULLER. Efforts are at this time quite new to expect results. If you followed the human insulin programs, they have been making quite some progress. I don't believe they are yet near commercialization. However, this work must be viewed as long-term.

We began our work about a year ago. We first undertook survey work to examine feasibility. We then started to solve the problems to achieve a first-stage distillery process which was to optimize available organisms by selection. We have just recently begun to study the fusion technique. Our next technique will be to examine genetic engineering, but we have had no results as yet.

Mr. ROSE. Is USDA doing any work in the area of genetic manipulation?

Mr. MULLER. Not to my knowledge.

Mr. ROSE. I discovered, as I told several members of the committee, that several scientists were actually working on a bacteria that would allow corn to fix nitrogen directly from the air.

Mr. MULLER. There is some work being done in Brazil on nitrogen fixation. However, they are attempting to bring the organisms together and allow them to mutate and select naturally, rather than to approach the mutation by direct genetic engineering.

Mr. ROSE. Mr. Bedell?

Mr. BEDELL. Dr. Muller, do you have information as to the net energy balance and as to what can be expected?

Mr. MULLER. Let me tell you what I know.

There was a publication by the University of Minnesota's Department of Agricultural and Applied Economics entitled "Economics of Gasohol, Economic Report ER 78-10". Their study was based on determining the energy required to produce the grain. They estimated this to be 39,780 Btu's per gallon of alcohol, and they estimated the energy required to convert the grain to alcohol to be 174,660 Btu's per gallon of alcohol. This requires a total energy input of 214,440 Btu's.

With a credit for the alcohol of 84,400 Btu's and a credit for the energy value of the DDGS feed grains as 52,000 Btu, the total credit is 136,400 or a net energy loss of 79,000 Btu's.

A preliminary design, based on experimental work we are now undertaking, we believe will be attainable if our design basis is confirmed. We estimate an energy consumption of 40,000 Btu's for the alcohol conversion and with other values remaining the same, we would estimate a net positive energy credit of 56,000 Btu's.

These are the preliminary numbers, of course.

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Mr. BEDELL. How do you look at the long-term profitability of alcohol plants without any Government subsidy?

Mr. MULLER. We are proceeding with our program. We are spending almost $2 million a year on research in the whole field. Our interest is not only fuel. We are also interested in using glucose, which is the material that is really fermented, as a raw material for chemicals and for fuel.

We have a program in Brazil working with a partner on a large-scale mandioca root farming operation. Mandioca is a tuber containing about 30 percent starch that is rather productive in poor quality soil with limited use of fertilizer. It seems to us to be rather good material to make glucose or alcohol.

We were planning a program to build a 50-million-gallon-per-year fuel alcohol plant using mandioca.

Mr. BEDELL. That is in Brazil, but how about the United States?

Mr. MULLER. In the United States we are currently looking at two possibilities.

We have a distillery in Louisville, Ky., which is now idle. We do not plan to use it as a beverage distillery any longer.

By changing the conversion facilities, installing a new distillation system and converting the fermentation to continuous, we hope to increase the plant capacity from 5,000 bushels per day to perhaps 15,000 to 20,000 bushels per day.

If it is feasible and economical, we would consider modifying this plant for gasohol purposes.

The other program we are examining is a complete new plant at our facilities in Tuscola, Ill. with 50-million-gallons-per-year capacity, using our new techniques.

Mr. BEDELL. I take it from your testimony that you believe that there is new technology being developed at this time with regard to the production of ethanol and that for us to take the figures from plants that are very old and say that it doesn't make sense to make alcohol does not hold water. Is that right?

Mr. MULLER. I think you should be considering new technology.

Mr. BEDELL. Thank you.

Mr. ROSE. Mr. Fithian?

Mr. FITHIAN. Thank you, Mr. Chairman.

Can you shed any light, Dr. Muller, on the number of plants in the country that might be available, like the Louisville plant?

Mr. MULLER. I had a discussion with a member of the Department of Energy on that subject. I tried to help him. However, the information is only with regard to the publication of the Bureau of Alcohol, Tobacco and Firearms, listing distillery facilities. The information is not up to date, because a great many plants have been abandoned and dismantled, I cannot shed much light.

Mr. FITHIAN. Is it fair to say that the capacity, that is, the unused capacity, either because the plant has been shut down or because plants are running at a less than maximum capacity, out there is fairly substantial? I mean the capacity that is in existence now.

Mr. MULLER. Of any existing capacity I don't believe there is much to make spirits of 190 proof. The plants would be mostly old beverage plants which manufactured 160-proof alcohol. Most would need distillation facilities. They would all need anhydrous facilities.

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Mr. FITHIAN. You have done some work with cellulosic conversion?

Mr. MULLER. We have done some preliminary work there. The mandioca root solids contain 10 percent cellulose. We have to find something to do with that.

When it is removed it is wet, so it does not burn.

We decided we would try to hydrolyze it and we ran some preliminary experiments and were able to hydrolyze it to sugar.

These were preliminary experiments and we are building some laboratory equipment to accelerate the program.

Mr. FITHIAN. As you know, I referred earlier to Mr. Tsao's work in this field. One question I have along that line has to do with your testimony where you said that you start out by using grain and then shift over to cellulosic.

Mr. MULLER. I don't think we would shift in the same plant, necessarily. I would think that by the time we got to that point, we could use the grain capacity. We are also in the beverage business and we use about 6 or 7 million gallons of pure ethyl alcohol for that purpose.

There has been a lot of comment about the difference in cost between making pure alcohol and fuel grade alcohol. I do not think it needs to be a great problem. I have spent many years in designing alcohol distillation plants.

Mr. FITHIAN. My question is whether or not physically in an engineering and chemical sense you can convert from using grain to going on to something else?

Mr. MULLER. You would have to change the front end of the plant. In one case you are handling grain and in the other case you have to hydrolyze the cellulose.

Mr. FITHIAN. It is my understanding that you added one more unit and then you are in business.

Mr. MULLER. You would have to change it and work out the problems involved.

Whether you retain heat balances for your steamloads and whether you can dispose of the byproduct effluent from the distillation system would depend pretty much on chemical balance in the feed stock. It would require a detailed engineering study. I can conceive of it.

Mr. FITHIAN. I have been told that one of the areas where we need considerably more research is in the area of continuous fermentation. I thought I detected something in your testimony that indicated that you had already reduced that.

Mr. MULLER. We have been running experiments for the past year in continuous fermentation. We are getting ready to go into pilot plant scale.

We have fermented to 10-percent alcohol concentrations in less than 8 hours by continuous fermentation for long periods of time.

Mr. FITHIAN. I have one last question.

Has the USDA been in touch with you on this subject?

Mr. MULLER. No.

Mr. FITHIAN. Thank you, Mr. Chairman.

Mr. ROSE. Mr. Muller, we want to thank you. I want to thank you also for bearing with us today and for being willing to stay

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here. We have about 15 witnesses tomorrow. There has been quite a bit of interest in this.

I have a theory about the complicated subjects like this. There are "wets" and "drys". I am not speaking of the distilling business. But some people will believe anything you tell them and some people will not believe anything you tell them regardless of the truth or falsity.

I have a feeling that there are some people who have rushed forward with the idea that gasohol would solve the total energy crunch. Some people do not believe it will have anything to do with helping the energy crunch that we are in.

I am convinced from what I have seen here today that there is a tremendous answer if we are clever enough to motivate the right people and fashion the right legislation to do that.

There is a real burden on our backs.

Mr. MULLER. I think what you say has a great deal of merit. I was rather pleased with Congressman Bedell's bill from the standpoint that here was a way of not cutting into the existing food market and using land that is now costing money to hold idle and getting a product out of that.

Of course it came to me at a time when I had been doing a great deal of work on the process itself.

I am convinced that I can make alcohol in competition if there is some reliable way of knowing where the pricing will go.

I think I can make alcohol from corn that is competitive with the alcohol from ethylene. Inasmuch as we are in that business to the extent of 50 million gallons a year of alcohol from ethylene, we always have a lot of flexibility in that area.

I think that is the first step. That is to try and do that and confirm the technology. The next step that I am looking forward to is to do work on these other materials like municipal waste and paper, wood chips, and anything else.

Mr. ROSE. Mr. Fithian?

Mr. FITHIAN. Let me say before we close, Mr. Chairman, that when I first got involved in this a little over 3 years ago, the argument of those who opposed any development in this area went something like this.

They said we would never become economically feasible until gasoline got to a dollar a gallon, as though that would never come in this century.

In your overall ballpark figures, at what point do you think it is economically competitive with gasoline?

Mr. MULLER. That is a difficult question because I have really not tried to make a calculation.

You always have to go back to gasoline at the refinery being 50 or 60 cents at this point. So there is a big gap in that price.

In rough numbers it looks to me like getting alcohol down with corn at $2.50 and byproduct credits on the grain, I would think that you could manufacture alcohol down below 80 cents, or 75 cents, or something like that.

You need to put a profit on that, and then with that profit you have to compete with gasoline. So, it will require some subsidy for quite a long time. I think it will be above a dollar.

Mr. BEDELL. Will the gentleman yield?

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Mr. FITHIAN. Yes.

Mr. BEDELL. There is about a 20 cent a gallon advantage because of the octaine booster qualities; right?

Mr. MULLER. In alcohol?

Mr. BEDELL. Yes. If you add 10 percent alcohol to gasoline we were told that the alcohol would be worth 20 cents per gallon more than gasoline because when you mix the 10 percent it will cost you 2 cents per gallon to raise the octane of the gasoline.

Mr. MULLER. I think that is an interesting point, yes. I did not consider that. I think that is a fair number. It is reflected in the price of the gasoline also. Then you might get it below a dollar.

Mr. ROSE. Mr. Bedell?

Mr. BEDELL. Let me take this opportunity to thank the chairman. I think it has been great that he has stayed here until this time.

Mr. ROSE. I enjoyed the subject. I thank you all, and I will see you here tomorrow at 2 o'clock in the afternoon.

Before we close, however, I would like to, without objection, insert a statement from Clarence E. Miller, Congressman from the Tenth District of Ohio, in the record.

The hearing is adjourned.

[Whereupon at 6 p.m, the subcommittees were recessed.]

[The prepared statement of Mr. Miller follows:]

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Prepared Statement of Hon. Clarence E. Miller, a Representative in Congress from the State of Ohio

Mr Chairman and Members of the Subcommittee, I appreciate this opportunity to comment on the importance of gasohol and to explain why H.R. 3018, the "Alcohol Fuel Additive Act of 1979"can provide a significant breakthrough for economically competitive gasohol.

One of the key challenges we must face in making gasohol an efficient and economically viable energy source is finding the best group of agricultural crops to produce ethanol. One promising alternative crop that could supplement the conventional corn system to produce ethanol is sweet sorghum. As you know, sweet sorghum is an annual crop grown successfully in the midwest and is commonly used to make black strap molasses.

Research is beginning to show that sweet sorghum could reduce the raw material costs of gasohol because of its higher amounts of fermentable sugar than other crops, thus making ethanol a more economically competitive fuel additive. The Battelle Research Laboratories in Ohio has concluded that once the technology is developed, sweet sorghum will become more economically competitive for making gasohol than ethanol produced from corn.

The advantages of sweet sorghum not only as an energy crop but also as raw building and paper material have also been identified in experimental work in Ohio. However, more research is needed for example, to develop high yielding, disease resistent varieties and preserve juice extraction before it can be commercialized as a fuel. More efficient harvesting equipment is also needed.

H.R. 3018 seeks to solve these problems by directing the Secretary of Agriculture to carry out research leading to the commercialization of alcohol derived from sweet sorghum and other hydrocarbon containing agricultural crops. This basic and applied research would include development of economical farm operations and commercial methods to extract sugar, ferment it and distill the alcohol produced. Research activity would include breeding of disease, insect, and weather resistant technology.

The bill also authorizes USDA to make research grants to states, scientific organizations, private non-profit groups and exchange of information among research entities and other government agencies. H.R. 3018 sets up a National Advisory Committee composed of representatives from the Department of Agriculture, Commerce, Energy, National Science Foundation, National Academy of Sciences, and the private sector to assist in the implementation of this bill.

Mr. Chairman, we all agree that the United States is too dependent upon foreign sources for its supplies of oil and oil derived fuels. Current supplies of commercial alcohol and other fuel additives which could be utilized to increase the supplies of fuels are either inadequate or not economically feasible to develop using present technologies. That is why further research and development is needed before commercialization of alcohol derived from sweet sorghum or other hydrocarbon-containing agriculture crops by private industry becomes feasible.

One last thing, it would be useful for this subcommittee to examine the benefits of ethanol as a gasoline "additive". We have received information that ethanol is an excellent octane booster and should help the oil companies produce high-octane no-lead gasoline. If this is truly the case, then the Federal government has one more reason to help private industry establish the commercialization of gasohol. H.R. 3018 emphasizes the "additive" properties of ethanol derived from sweet sorghum and other hydrocarbon-containing agricultural crops.

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NATIONAL FUEL ALCOHOL AND FARM COMMODITY PRODUCTION ACT OF 1979

WEDNESDAY, MAY 16, 1979

HOUSE OF REPRESENTATIVES, SUBCOMMITTEES ON CONSERVATION AND CREDIT, DEPARTMENT INVESTIGATIONS, OVERSIGHT, AND RESEARCH, AND LIVESTOCK AND GRAINS, OF THE COMMITTEE ON AGRICULTURE,

Washington, D.C.

The subcommittees met, pursuant to recess, at 2:05 p.m. in room 1302, Longworth House Office Building, Hon. Charles Rose (chairman of the Subcommittee on Livestock and Grains) presiding.

Present: Representatives de la Garza, Bedell, Fithian, Skelton, Glickman, Daschle, Stenholm, Wampler, Sebelius, Madigan, Grassley, and Hagedorn.

Also present: Representative Findley, member of the full committee, and Harry Brown, Office of Energy, U.S. Department of Agriculture.

Staff present: Peggy Pecore, clerk; Humberto Pena, Claude Freeman, Anita Brown, Gerald R. Jorgensen, and Wayne A. Fletcher.

Mr. ROSE. The subcommittees will please be in order.

Our first witness today is Mr. Alvin Alm, Assistant Secretary for Policy Analysis and Evaluation of the U.S. Department of Energy.

We are happy to have you, Mr. Alm.

STATEMENT OF ALVIN L. ALM, ASSISTANT SECRETARY FOR POLICY AND EVALUATION, U.S. DEPARTMENT OF ENERGY; ACCOMPANIED BY EDWARD H. BLUM, ACTING DIRECTOR, OFFICE OF TECHNICAL PROGRAM EVALUATION; AND MARILYN HERMAN, CHAIRPERSON, ALCOHOL FUELS POLICY REVIEW

Mr. ALM. Thank you, Mr. Chairman.

I have a rather lengthy statement. If you wish, I would suggest I merely summarize the main points.

Mr. ROSE. We thank you. Without objection, we will insert your entire prepared statement.

Mr. ALM. Mr. Chairman, and members of the committee, I am delighted to have this opportunity to discuss the administration's policy toward alcohol fuels.

As you are probably aware, for some time the Department of Energy has been conducting an alcohol fuels policy study. I would like to summarize some of the points of that study and some of the initiatives that have grown out of that study and out of other Department and administration initiatives.

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First of all, let me state our general position on alcohol fuels. We believe that alcohol fuels can make a real contribution to extending the Nation's liquid fuel supplies. Alcohol fuels provide an octane booster and provide a market for vehicles that cannot normally run well on leaded regular gasoline.

Of course, of substantial importance is the fact that alcohol fuels are renewable. They are domestically derived. These are very important assets.

I must say that I spend a great deal of my time worrying about gasoline lines and shortages. It is good to look ahead at a possible supplement to our liquid petroleum supplies.

If I may, I would like to cover some of the major initiatives that the Department has recently taken.

We have increased funding for alcohol fuels. We have increased it by $2.7 million in 1980 over 1979 to a total of $23 million. I might add that this is over a base of only $2 million in 1977. So we have had a very substantial increase in our budget for alcohol fuels.

The Department has included alcohol fuels as part of its entitlements program providing roughly $1.50 per barrel subsidy through the entitlements program.

Perhaps the most important is that the National Energy Act exempted gasohol from the 4 cent gasoline tax. However, the National Energy Act only provided this exemption through 1984.

In the President's April 5 message, he indicated that he would like to make this exemption permanent. By so doing, we are providing a very substantial incentive for the construction and operation of new gasohol plants. The current incentive only provides an incentive to utilize existing capacity.

We are working with the Treasury Department on assuring that alcohol fuels will receive the additional 10 percent investment tax credit provided in the National Energy Act.

The President recently indicated that the administration would undertake a program of grants to small-scale alcohol fuels applications. Low-interest loan guarantees and grants of $11 million will be provided through EDA and CSA.

The President also indicated that the Federal fleet would begin to use gasohol as a method of testing gasohol as well as a further stimulant to the market.

We are examining further initiatives in the area of removing institutional barriers, better information dissemination, and we are looking at the designation of a key focal point in the Department of Energy to coordinate all alcohol fuels activities.

Let me now discuss some of the key findings of our study. First of all, as I indicated earlier, we do believe that gasohol can supplement unleaded gasoline supplies. I might add that unleaded gasoline is the area of greatest demand—about 35 percent of gasoline is currently unleaded. By 1981 this will increase to 50 percent, and by the mid-eighties unleaded gasoline should be three-quarters or more of the total gasoline supply.

We estimate that by 1982 gasohol could provide about 300 million gallons and by 1985 500 to 600 million gallons.

In terms of raw material supplies we believe there are sufficient waste and distressed raw material supplies to meet likely production levels. We estimate that the raw materials immediately avail-

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able for alcohol conversion could produce 600 million gallons of alcohol.

In the longer term more than 4 billion gallons of ethanol could be derived from supplementing these wastes with municipal solid waste and bringing productive cropland into use.

Let me mention that this figure is an upper bound, but it does indicate the ultimate potential of raw material supplies for the production of ethanol.

Major constraints to alcohol fuel; that is, the major current constraint is the lack of conversion capability. Current capacity to produce alcohol fuels is about 20 million gallons per year. In order to expand that capacity there has to be a permanent incentive so that new plants will come on line and the President's exemption from the gasoline tax should provide that incentive.

In terms of energy balance, our analysis shows that alcohol fuels can be produced with positive fuel gain as long as petroleum and natural gas use are minimized in the process.

Indeed, if coal or biomass were used as the process heat, and if waste materials or coal processed materials are used, you could reach almost 100 percent conversion of liquid fuels.

As far as we are concerned the net energy balance, as long as you are using coal or other materials is not the issue, but the issue is the production of petroleum products, if that can be done with a minimum of petroleum used for either the growing of the crops or through the distillation process, then the country has a very substantial net gain.

Overall our conclusions are that alcohol fuels are a useful supplement to our supply. Our basic strategy at DOE is to help assist the private sector to develop rapidly while at the same time conducting R. & D. aimed at further cost and energy efficiency improvements.

At this point I will be happy to answer any questions you may have, Mr. Chairman.

[The prepared statement of Mr. Alm follows:]

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We are currently working with the Economic Development Administration and the Community Services Administration in developing specific guidelines for this program.

The President's initiatives are based in part on the extensive information and recommendations developed by the Department of Energy in a comprehensive evaluation of alcohol fuels conducted by the Department's Alcohol Fuels Policy Review. This Department-wide task force was established by the Under Secretary of Energy in July 1978. As head of that task force, I was charged with the responsibility of assessing the full potential of alcohol fuels through a series of key policy studies, and for determining what additional Federal steps should be taken to further the development of alcohol fuels.

As part of its study, the Alcohol Fuels Policy Review conducted extensive public hearings to give interested members of the public an opportunity to present their views on key issues relating to alcohol fuels. Members of Congress, State legislators, industry officials, farmers, private citizens, consumer groups, and representatives of States organizations and agencies testified. Department officials travelled in the field to talk with large and small scale producers to ensure that adequate information was received from all sources. We consider the information and recommendations received as part of these public meetings a valuable

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our national energy problems. While it is clear that alcohol fuels cannot be a total or, in the near-term, even a major solution to our national energy needs, they do represent an important energy component and building block for the longer term. Our national energy needs must be met by actively conserving and aggressively developing contributions from a large number of energy supplies, building on our nation's abundant resources. Alcohol fuels represent important supplies based on the strength of the American agricultural system.

Key Findings of Department of Energy Study

The detailed report of the Alcohol Fuels Policy Review is currently being made final, and will be issued shortly. I would like here to note some of the more important conclusions. A principal finding is that alcohol fuels (both ethanol and methanol) can contribute to U.S. energy resources by using domestic, renewable resources and coal to extend supplies of high-quality liquid fuels. Maximizing this contribution will require reducing the use of oil and gas in producing feedstocks and converting them to alcohol.

Alcohol's Potential for Petroleum Savings

Blended with gasoline, alcohols can supplement U.S. oil supplies as a motor fuel extender and octane improver.

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Indeed, in the near term, (1979-1985), the contribution will come primarily from gasohol, a mixture of 10% ethanol and 90% gasoline, which can be burned in present motor vehicles with at most very minor materials or engine modifications. Adding the ethanol to unleaded gasoline not only extends gasoline supplies but raises the octane by roughly two points.

This is particularly attractive at a time when higher octane leadfree gasolines are in short supply and other octane enhancers such as MMT and lead are under restrictions. Through the early 1980's, when U.S. octane-producing capacity may be limited, alcohol fuels may help to increase U.S. capability to produce unleaded gasoline and reduce energy losses that occur in the severe reforming of gasoline components.

For most of the 1980's, production capacity for converting raw materials to ethanol will limit the production and use of gasohol; supplies of raw materials will not be a limit. Abundant supplies of raw materials are available, and far exceed the production capacity of alcohol plants expected to be operating by the mid 1980's.

Present incentives appear likely to increase ethanol fuel production from a current level of approximately 20 million

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gallons per year to a level of approximately 300 million gallons per year by 1982, with gasohol use thus reaching 3 billion gallons or 3% of present gasoline consumption. This increase in production capacity is likely to come predominantly from use of present unused distillery capacity and expansion of present facilities.

A permanent extension of the $.04 per gallon Federal motor fuel excise tax exemption, for all fuel containing at least 10% biomass alcohol, as the President has proposed, would encourage investors to build new alcohol fuel facilities. By 1985, stimulated by these incentives, biomass alcohol fuel production may be able to reach 500 to 600 million gallons per year. This quantity would be more than twice total U.S. ethanol production in 1977 (two-thirds of which came from petroleum) and five to eight times the biomass alcohol fuel production estimated for late 1979. It would substitute for 30,000 to 40,000 barrels per day of petroleum, and could result in reducing petroleum imports by as much as 0.3 to 0.4 percent if minimal petroleum is used in its manufacture.

In the long term, beyond 1985, ethanol use will depend on the amount of new conversion capacity built, on the availability of inexpensive feedstocks, on new developments in

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technology and their impact on costs, and on the relative costs of competing fuels. As crude oil and gasoline prices continue to climb, the cost of alcohol fuels may become more competitive with petroleum. Costs for ethanol fuels should be reduced by new technologies, especially those that reduce the capital and energy needed for conversion and those that improve the value of the coproducts produced with the alcohol.

Methanol from biomass and from coal is expected to play a larger role in the long term, as its use in turbines and other stationary equipment increases and as materials and engines are adapted to facilitate its extensive use in motor vehicles.

Current Federal Incentives

Alcohol fuels now enjoy a wide range of government incentives. The government provides alcohol fuels several direct subsidies:

- The National Energy Act motor fuel excise tax exemption on gasoline/alcohol blends, worth $16.80 per barrel of alcohol on ten percent blends (some states have also exempted these blends from state excise taxes);

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- Inclusion in the Department of Energy's Entitlements program, worth roughly $1.50 to $2.00 per barrel; and

- Loan guarantees for alcohol pilot plants, administered through USDA.

In addition, alcohol fuels facilities should soon qualify for the 20% investment tax credit enacted in Title III of the Energy Tax Act of 1978. The government also gives support through its research and development programs. The Department of Energy's research and development funding relating to alcohol fuels has increased from $2.7 million in FY 1977 to $23 million in FY 1980.

The Federal government has already taken steps to remove regulatory and institutional barriers to alcohol development. In 1978, the Department of Energy's Economic Regulatory Administration (ERA) adopted pricing regulations that permit the full cost of ethanol in gasohol to be passed through to the consumer. ERA has also clarified the net energy criteria in the Entitlements Program to ensure that processes making fuels from biomass could qualify when they produce a higher value fuel than they consume in producing the fuel.

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Demand for Gasohol

Over the past six months, small but growing regional markets have developed. A year ago, a primary concern was how to launch an alcohol fuels industry. Today, stimulated by a grass roots movement, local and State actions, and significant Federal subsidies, an industry has been launched and is growing rapidly. Demand for alcohol fuels has exceeded the supply of alcohol immediately available for fuel use. Producers that dealt solely with beverage and industrial markets are now expanding production to enter the alcohol fuel market, and many potential small-scale producers are planning to build facilities.

In one year, the number of retail outlets marketing gasohol has increased from a few to over 700. Gasohol is currently being sold in Illinois, Iowa, Indiana, Michigan, Minnesota, Missouri, Montana, Nebraska, New York, North Dakota, Ohio, Virginia, Wisconsin, and Wyoming. Sales are expected to continue to expand as additional supplies of alcohol become available.

Iowa has exempted gasohol from state gasoline taxes of 6 1/2 cents per gallon, giving a total subsidy exceeding $1.00 per gallon of alcohol, or over $42.00 per barrel. Sales of gasohol there have increased rapidly from 600 thousand

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gallons in November 1978 to 4 million gallons in January 1979 to 5.6 million gallons in March 1979. March gasohol sales represent approximately 2.5 percent of all gasoline sold in Iowa that month. Alcohol fuels can evidently contribute on a regional level.

The large increase in demand for gasohol is based on consumer preference for vehicle fuel derived from renewable sources, a selling price comparable to premium unleaded gasolines, and consumer perception of the fuel as a high quality motor fuel. Gasohol is an attractive fuel to many motorists who feel they need higher octane unleaded fuel. Whatever the motivation, it is clear that a broad-based grass roots movement to develop and support alternative domestic supplies of liquid fuel has been at the heart of gasohol's success.

Raw Material Supplies

The Department of Energy has devoted serious attention to assessing the potential of raw material supplies for alcohol production.

As discussed earlier, a key finding of our analysis is that through much of the 1980's, U.S. alcohol production will be limited by the capacity of the facilities that convert raw materials into alcohol. Supplies of surplus, distressed,

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waste, and by-product materials suitable for alcohol production already greatly exceed the capacity to convert them, and are likely to continue to do so until the mid 1980's.

Through the mid-1980's, then, there appears to be sufficient surplus and waste raw materials to meet any realistic projected level of alcohol production. Utilizing commercially available technology, there are enough raw materials available to yield 660 million gallons of ethanol or 6 billion gallons of gasohol, if conversion capacity were available. These feedstocks include food processing wastes and either distressed or substandard grain, which represent only 5-7% of existing corn and grain sorghum stocks.

The feedstocks that will be used to make alcohol fuels in the 1980's are not likely to be foodstuffs but rather waste materials and distressed products, as they are the lowest-cost feedstocks.

Very little food material need be consumed in producing alcohol fuels. In many instances, the alcohol is a co-product of other food production processes. In fact, current practice is to produce alcohol from the by-products of corn sweetener plants, or from food processing wastes such as cheese whey and citrus wastes. This appears to be

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sound business practice, since the net costs of these waste materials could be quite low.

In addition, alcohol production from grain and municipal solid wastes yields a by-product that can potentially extend feed supplies. Recovering as co-products the proteins and nutrients present in many raw materials can improve alcohol economics and reduce possible conflicts between needs for food and needs for fuels. Producing ethanol by fermentation uses large fractions of the carbohydrates in vegetative material, but leaves proteins and minerals for the by-products and animal feed. Distillers Dried Grains and other similar high-quality by-products can be produced with the alcohol from many materials. Research is currently underway to use these as a human food supplement.

There does not now appear to be a need to grow additional crops for alcohol production. Farmers may however, choose to grow crops specifically for that purpose; such decisions should be left to the private sector.

In the longer term, if alcohol fuel conversion capacity exceeds levels readily sustained from wastes and by-products, then it may be worth considering encouragement of additional crops--including energy crops, such as sweet sorghum, which do not compete with food, feed, and fiber, or

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of utilizing set-aside acreage for alcohol crop production. From our analysis, it appears that an upper limit of approximately 4.7 billion gallons of ethanol could be produced from raw material supplies, if conversion capacity capable of manufacturing these feedstocks existed. This limit could be achieved by bringing into production all existing grain land, and by supplementing food processing wastes with sugar surpluses and municipal solid waste.

For the longer term, the Department of Energy is also sponsoring research to develop processes to convert cellulosic materials to ethanol. These would open a wide range of feedstocks to energy uses. These feedstocks include agricultural residues, garbage and other cellulosic materials which could supplement ethanol production from food processing wastes, sugars, and grains. The design and development of alcohol plants with multi-feedstock capability may become increasingly important in order to enable utilization of diverse feedstocks, and to avoid problems with fluctuations in supply that may occur as a result of planting variations, weather, domestic market fluctuations, variable export demands, and fluctuations in world prices. How much potential cellulosic materials offer for ethanol production depends on the technologies developed to convert them and on competing demands to use them for soil maintenance, direct burning, gasification, and methanol production.

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The National Fuel Alcohol and Farm Commodity Production Act of 1979

I would now like to address H.R. 3905, the National Fuel Alcohol and Farm Commodity Production Act of 1979. This bill would establish a $600 million loan guarantee program for the construction of plants for production of alcohol made from agricultural commodities used for motor fuel. This bill would also eliminate the existing set-aside/land diversion control program for feed grains. Grain producers would be encouraged to go to full production with an established target price of $2.50 per bushel (for corn) and a loan rate of $2.10 per bushel of corn. Producers would be required at the request of USDA to make available 10% of their grain production for use as a feedstock for alcohol production.

The Department of Energy fully agrees that the production of alcohol fuels from renewable resources should be encouraged. In this regard, we recommended to the President that several key initiatives be taken to increase the availability and use of alcohol fuels. The extension of the $.04 a gallon excise tax exemption for alcohol fuels/blends from renewable resources, the 10% additional Investment Tax Credit, and the newly established program to provide loan guarantees and low interest loans to construct 100 small scale alcohol facilities are major incentives designed to bring about increased

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alcohol production and use. We feel that current and proposed Federal and State incentives for alcohol fuels are sufficiently powerful to stimulate increased alcohol production and use. However, should it become necessary to take additional steps to stimulate further the development of alcohol fuels, we would work to ensure that appropriate measures are taken.

Alcohol Production Economics

With improvements in technology and economies of scale, alcohol fuel costs can be reduced. Alcohol is currently selling for $1.20 - $1.50 a gallon. Employing advanced available technology, optimized for energy and cost savings, our studies show that ethanol could be produced for under $1.00 per gallon in a plant with a 50 million gallon per year capacity.

Cost reductions appear possible through:

- Use of continuous fermentation processes.
- Design of energy-efficient (e.g., vacuum) distillation and use of advanced extractive techniques.
- Coupling conversion facilities with supplies of low-cost waste materials.

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- Improvements in production and feedstock collection technology and by-product uses.

Another key is reducing net feedstock costs. Corn, for example, now sells for roughly $2.50 per bushel. Since one bushel of corn yields about 2 1/2 gallons of ethanol, the feedstock cost alone would be $1.00 per gallon unless the value of co-products are recovered. Feedstocks thus need to be viewed as part of a processing system - not as raw materials for ethanol alone.

Cost projections for methanol are considerably less - in the range of $0.30 to $0.60 per gallon from coal, higher from biomass. But the capital investment to produce methanol is substantially more than that for ethanol, and the energy content of methanol is lower so that significant quantities of methanol from coal or biomass are not currently produced in the U.S.

Net Energy Balance

One question often raised about ethanol production is whether it yields a net energy gain. The key issue surrounding alcohol fuels is not whether it can produce a net energy gain, but whether it can produce a net gain in high quality fuel.

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Ethanol fuels can be produced to yield a net gain in fuel. The oil displacement value of alcohol depends on reducing the petroleum and natural gas used in growing and converting materials. (It also depends on technical details of ultimate use, including automobile mileage using gasohol and the value of incremental octane additions.) To minimize petroleum use, alcohol production facilities should be designed or redesigned to run on coal, on agricultural or wood wastes or solar heat, where economic, or on waste heat from industry or utilities, where it is available. The energy required to grow and transport crops may amount to a significant fraction of the resulting alcohol energy value. Therefore, the materials used to produce alcohol should in general be wastes, by-products, spoiled products, or yield co-products of substantial value, since additional energy is not required to produce them.

If oil and gas use are minimized throughout, net energy balance need not be a major concern; then a high-value petroleum substitute is created from lower quality fuels. To ensure that petroleum savings are achieved in the production of alcohol fuels, the use of oil and gas in alcohol production will be discouraged and the use of coal, renewable materials and sources, and waste heat will be encouraged.

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CONCLUSION

The Department of Energy is firmly committed to maximizing the net contribution of alcohol fuels to the Nation's liquid fuels supply and to helping alcohol fuels achieve their potential in the Nation's energy future. To achieve this basic goal, we are giving serious attention to the development of alcohol fuels. We also emphasize the need to minimize the use of oil, natural gas, or other scarce resources in producing the raw materials and converting them to alcohol.

The strategy to achieve this goal has two parts:

- o Industrial development, in which the Federal role is to help the private sector develop rapidly.
- o Research and development, in which the Federal role is to help build the foundation on which alcohol fuels can compete effectively with petroleum-derived fuels and other alternative fuels in the 1980's and beyond.

The three alcohol fuels initiatives set forth by President Carter are major elements in this strategy. We have touched on the remaining elements here today. They will be fully set forth in the report by the Alcohol Fuels Policy Review when it is issued shortly.

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Mr. ROSE. Thank you very much, Mr. Alm. We appreciate that. I will call on Mr. Bedell.

Mr. BEDELL. I want to thank the gentleman for his testimony. The President has indicated that $11 million in loans would be made available for some 100 small plants. Does it take legislation or is it available through Executive order?

Mr. ALM. The funds would be available within the current budgets of the Economic Development Administration from which $10 million of the $11 million would come from and $1 million would come from the Community Services Administration.

The only Federal action was the President's announcement, obviously, and the signing of an interagency agreement. It happens that I signed that agreement this morning before this hearing so we are ready to move in that area.

Mr. BEDELL. When will that money be available if there were proper applicants who wanted to receive loans?

Mr. ALM. There are certain steps in terms of getting application forms and the like. The guidelines are under preparation now. We should be able to take applications some time this summer.

Mr. BEDELL. Some time this summer?

Mr. ALM. Yes, sir.

Mr. Bedell, let me do this. Let me have a meeting of the other two agencies and get a firm schedule on that and get back to you.

Mr. BEDELL. All right. It appears to me that we have something that is economically viable at this time. Our objective should be to get moving as quickly as possible. I think it would be in the national interest for the subcommittees to expedite the implementation of this loan program.

Thank you, Mr. Chairman.

Mr. ROSE. Thank you.

Let me compliment you for entering into that interagency agreement. I think that is an excellent step, Mr. Alm, that you are willing to do that. We certainly appreciate your understanding of how concerned we are about this.

Mr. Wampler?

Mr. WAMPLER. Thank you, Mr. Chairman.

Mr. Alm, I want to thank you for a very fine statement this morning. I want to commend you on the action that you have taken and that you will hopefully make gasohol a more realistic alternate source of energy. Hopefully it would become a principal source, perhaps.

I represent a major coal producing constituency. All of the coal that is mined in Virginia is mined in the congressional district I represent. Why are we not using coal more?

Mr. ALM. I think there are a number of reasons that coal use has not achieved expectations. First of all, the substantial reduction in the electricity demand resulted in the cancellation of a large number of plants, that is both nuclear and coal-fired.

Second, the uncertainty of some Federal policies has had a detrimental effect. Certain environmental policies, rail rates, and other activities—perhaps DOE's own coal conversion program—have added to this.

We became concerned about the pace of coal production, and as a result part of the President's April 5 message dealt with the poten-

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tial for coal. The President directed the three major Federal agencies with responsibility for coal to conduct a study within 60 days and report back to the President.

The Department has held a number of meetings on our portion of the study. We have identified the issues, and we will be reporting to the President.

In addition, the departments work very closely with the Environmental Protection Agency on the issue of new source performance standards. We have submitted our comments on the new source performance standards. Our comments deal with what we think would provide greater incentives for the production and use of coal in the United States.

We have also taken a great deal of interest in rail rates. We have intervened in a number of railroad coal transportation cases, our concern being that if railroads require coal transportation to bear a disproportionate part of the cost of railroad operations, we can cut out the favorable economics of coal.

That is rather a long answer. In summary, it is a combination of lower demand, uncertainties, and certain environmental and other restrictions that have harmed the development of coal for sources in the United States.

Mr. WAMPLER. It is awfully difficult for a number of my constituents to understand when we are supposedly caught up in the vise of a very serious energy squeeze. I can report to you first hand that there is coal being mined above ground, now in inventory, that cannot be sold. There is no market for it. Many of our coal operations are working short shifts. Many of them are now down to 2 and 3 days a week.

So, I would certainly encourage you as one of the principal energy planners in the country to come up with a better way to utilize coal as one resource we have in abundance

I am told that we have an inventory of well over a trillion tons of coal. That is a thousand billion tons. It is enough to meet all of our projected energy requirements for the next several centuries, but because of reasons you have cited—and I think the failure in the legislative and executive branches of the Government to assign coal its proper role—we have this situation.

I might say that at our land grant university in Virginia some meaningful research is going on right now using coal for agricultural purposes for heating poultry houses and other uses. Essentially they are testing furnaces that were developed in England where they had no choice but to come up with new technology. I certainly would invite your attention to that because it seems to me this is an area where we could help and it is an area that our committee has been particularl concerned with in the production of food and fiber and the processing of it. I would hope that you would give more attention to coal.

As an interesting sidelight, I was in South Africa some years ago. Near Johannesburg they were making, at that time, gasoline from coal. I am told that South Africa now is building Sassale Three and Four at an expenditure of some $4 billion. This is an awful lot of money in South Africa. We waste that much here, I suppose, in a year's time in the governmental processes. However, in terms of their gross national product, that is a substantial commitment. As

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you know, and as I am told, South Africa has no gas or oil—certainly no oil—and they are using coal.

We have the capacity to do this but we have just not made the commitment. So, while I am concerned about the development of gasohol and anything that is a renewable resource, it would seem to me that we have not yet adequately addressed ourselves to the potential of coal. Again, I hope as you are formulating your policy that you will permit coal to take its place because I think it could help us lessen our reliance on imported oil which we all concede is the source of a great deal of our energy problem.

Mr. ALM. Let me assure you that coal certainly has that priority in the very near term. Direct use of coal is the only alternative that can make a substantial difference, particularly in the electric utility sector.

It does raise a point, however, and that is the need for moving on a wide range of energy sources to get there, whether it is something with a tremendous base, like coal, or supplements like alcohol fuels. There is no single path to dealing with the energy problems. We have to push in many directions.

Mr. WAMPLER. I understand that. I commend you for what you have done, and I encourage you to continue to take these positive steps that this committee is vitally interested in.

Thank you, Mr. Chairman.

Mr. ROSE. Mr. Alm, let me give you some free advice.

Mr. Wampler comes from a part of this country that is well acquainted with coal and with alcohol production. Anything you can do to tap onto his resources will help the energy shortage.

Let me ask a question. Is the representative from the U.S. Department of Agriculture here?

[No response.]

Yesterday the Deputy Secretary told us that he was going to have someone here for our hearings. Then Harry Brown, who is Weldon Barton's assistant, told me that he would bring us information today about the demonstration project. Is there no one here from the U.S. Department of Agriculture with that information?

[No response.]

I recognize Mr. Bedell.

Mr. BEDELL. My understanding was, Mr. Chairman, that we were further assured that there would be somebody here from the Deparmtent of Agriculture so that the Department of Agriculture and the Department of Energy would be aware of what occurred at these hearings.

Mr. ROSE. They have more to do than you, obviously. Mr. Fithian.

Mr. FITHIAN. Thank you, Mr. Chairman.

Mr. Secretary, I want to welcome you here, and I especially want to welcome what I take as the tenor of your testimony as compared with what I have seen of your written testimony. After trying to work with the DOE for the last 3 years on alcohol fuels, I think that this represents a startling new direction down there.

Perhaps my friend from Virginia might join me on this point but it has been my observation that the Department has been basically dominated by oil and nuclear power enthusiasts and these other

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matters, whether it is coal or alcohol fuels, have been pretty much the orphan children of the energy family.

I do congratulate you, then, on what I took to be a startling alteration of position of the Deparmtent. I want to commend through you the President for his recent announcement, and I would urge you to hurry on with the guidelines because we have had some rather exciting developments as evidenced in yesterday's hearings and elsewhere.

Let me ask this. I am wondering whether or not what you are telling us is basically what we want to hear or whether this really does represent a policy thrust.

Mr. ALM. Most of the things that I talked about are tangible realities. I talked about making permanent the exemption of the 4 cents a gallon gasoline tax-exempting alcohol fuels from that tax and making it permanent. I have talked about the $11 million small loan guarantee program.

I think you ask a fair question. Is the administration putting up a program to match the rhetoric? I would answer that the program, I think, is a very aggressive program.

Mr. FITHIAN. I thank you for that response.

Could you make a commitment that even though we are not on the Department of Energy authorizing committee that those of us on the Agriculture Committee who have been working on this might be put on your mailing list for the guidelines that you talked about coming up with this summer?

Mr. ALM. Certainly.

Mr. FITHIAN. As soon as they are available?

Mr. ALM. Certainly.

Mr. FITHIAN. I will not press you for a date. I understand that it will be as soon as you can get them out. Is that correct?

Mr. ALM. Let me make clear that the guidelines would be guidelines of the other agencies, the Department of Commerce and CSA. We will do what we can to push the process along but ultimately those agencies will issue the guidelines. However, I will provide the committee a schedule after talking to the agencies, and I will suggest that they make it a matter of practice to keep this committee informed. Also, we will keep you informed. Ms. Herman, here, will work with the committee.

Mr. FITHIAN. Thank you very much. Let me ask one other line of questioning. I know we have 15 witnesses this afternoon, including panelists, Mr. Chairman, and we cannot tolerate too much time with each, but let me pursue this just a bit further.

We have been picking up information that would lead us to conclude that we really ought to go in two parallel directions insofar as support programs are concerned. One is the large demonstration-type plant that would really be addressing the problem of major production facilities.

The second is the increasing information that we could also think small in terms of on-farm production for a small handful of farms.

I need not remind you that the farmers are the largest per capita consumers of energy in the country. To the extent that we could solve that problem, even make a dent in it, is to the extent that we would solve the whole energy problem, in my judgment.

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Will you be running on this parallel track? So many times a large department can only get involved if you are talking about a $10 million loan guarantee. We had some witnesses yesterday afternoon who indicated that they had made some rather startling breakthroughs for developing plants with the on-farm capacity for $40,000, or $100,000, or even less than that. Will it be your policy to try to move forward on both these levels?

Mr. ALM. Indeed, yes. That is precisely what this strategy is that we are pursuing. The tax incentives tend to be aimed at larger scale production. The loan guarantees aimed at small-scale applications, including on-farm use. We are pursuing both stragegies.

Mr. FITHIAN. Let me thank you, and I want to thank you, Mr. Chairman.

Mr. ROSE. Mr. Hagedorn.

Mr. HAGEDORN. I am both pleased and somewhat disappointed. I am pleased by the direction in which the Department of Energy is finally branching off. I think they have had a bias against this source of energy for some time. They have not been very much interested in this, or demonstrating foresight as to what the potential cost of fossil fuels would be doing in the future in comparison to renewable resources. That is, of course, the positive part of your statement.

I am disappointed, however, when you get to page 16 of your written testimony and you address the legislation that Mr. Bedell has introduced and similar legislation that others have introduced. It gets into the meat of the matter and that is providing a substantial loan guarantee program for the establishment of ethanol and methanol producing plants.

I think most of us here, judging by the action that has been taken in a number of committees from Banking and Housing to Agriculture and other committees, that are proposing hundreds of millions, and in some instances $2 billion for syn fuels and alternative sources of energy, that your conclusion on the top of page 17 suggesting that $11 million in a hastily put together program to appeal to the farmers in the Midwest is adequate. I would sense that when we get the Department of Agriculture, the Department of Energy, the Department of Commerce, and the Department of Housing into gasohol that perhaps we are getting such a fragmented approach that the Government is going to say that they have a dabble here and a dabble there, and that is enough.

My concern is that you are not here today supporting this kind of legislation as part of the administration and wanting to do something comprehensive for the long-term, and not suggest that $10 million and the reduction of the Federal excise tax on gasoline is an adequate incentive during these current times.

With that statement, let me conclude. I say that I am pleased with the direction that DOE is starting to go, but I am disappointed in the magnitude of your support.

Mr. ROSE. Mr. Madigan.

Mr. MADIGAN. Thank you, Mr. Chairman.

Let me apologize for being a few moments late. As a consequence I am not entirely sure I understand exactly what Mr. Alm has told us they are going to do. As I understand it, there is going to be an exemption from the 4 cent Federal gasoline tax.

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Mr. ALM. That is correct.

Mr. MADIGAN. Is that going to be on the ethanol or on the combined ethanol-gasoline——

Mr. ALM. It is on the combined product. Let me take you through the mathematics.

It is 4 cents a gallon for gasohol. That means 40 cents a gallon for the 10 percent ethanol portion and that subsidy then works out to $16.80 per barrel which is about what the current world oil price is.

It is for this reason that we think the subsidy ought to be tried before we move into other subsidies. Our mind is not closed. This is a substantial move forward, we think. We think the small operators obviously need some support.

Mr. MADIGAN. Let me see if I can understand the consequences. What you have told me is that if I buy gasohol rather gasoline, I am not going to pay the gasoline tax; right?

Mr. ALM. That is right.

Mr. MADIGAN. So the subsidy is to me as a consumer; right?

Mr. ALM. That is right. That creates a market demand.

Mr. MADIGAN. It is my recollection that when we passed the Highway Act last year, we passed about 5 years of expenditures, or rather 4 years of expenditures against 5 years of revenue. In other words, that Federal motor fuel tax fund is already overspent by some 20 percent. It is already deficient by that amount.

What you are proposing is to exclude from the payment of that tax everybody who uses gasohol so that if 10 percent of the people wind up using gasohol, then this fund will be 30 percent short of meeting its obligations rather than 20 percent short.

My curiosity, of course, is aroused. I wonder if you have calculated what the impact of this is upon the highway system of the United States.

Mr. ALM. We have made some calculations. However, let me begin with this. The administration may replenish the funds taken from the highway trust funds through a request for general appropriations or it may come out of the fund. That decision has not been completely tied down.

In terms of the amounts of revenue, if we are up to 500 or 600 million gallons of alcohol—which is about $200 million a year that would be lost—then that is what you have.

Mr. MADIGAN. A company in my district has just sold 1 million gallons. It is going to be distributed through some outlets in the city of Chicago. I understand there is a possibility that that company and another company are going to engage in some agreement with a farm organization that owns several stations in central Illinois and other places. They are going to sell this substance and sell it on a pretty broad scale, perhaps this summer. But certainly by the end of this year.

I wonder, since gasohol is catching on like that, if you have really calculated how much gasohol might be used a year from now in the Midwest or in the country as a whole?

Mr. ALM. We have calculated about 100 million gallons.

Mr. MADIGAN. Let me ask you this. The fact that you have agreed to do this, does that mean it is done? If I go out tomorrow

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and buy gasohol, am I exempt from the Federal tax or what else must happen?

Mr. ALM. Absolutely.

Mr. MADIGAN. I am exempt?

Mr. ALM. Yes.

Mr. MADIGAN. The interagency group of the Department of Energy, the Department of Agriculture, and who else?

Mr. ALM. The interagency agreement that we are talking about is between the Department of Energy and the Department of Commerce, and the Community Services Administration.

Mr. MADIGAN. That is where you get the $11 million?

Mr. ALM. That is correct. From the Commerce Department's EDA, $10 million, and $1 million from CSA.

Mr. MADIGAN. That $11 million is going to build 100 small plants. Is that right?

Mr. ALM. That is for loans to help build 100 small plants, yes.

Mr. MADIGAN. That is about $110,000 per plant.

Mr. ALM. That is correct.

Mr. MADIGAN. Is that a significant amount of money?

Mr. ALM. Mr Blum is closer to this, and he will answer the question.

Mr. BLUM. It is intended that those loans supplement the capital from the farmers and the co-ops and the people who would want to build the plant. In other words, it is not intended that these plants be 100-percent government financed, but that these loans be made to help supplement the capital that is available in the private marketplace to these people. These loans would then leverage a good deal more capital so that as much as, or easily, a quarter of a million dollars each or a half million dollars each ultimately if this goes into a revolving fund over a period of time then, would be available for these plants.

So, this is not intended to be the total expenditure on these facilities. For a small facility that may be all that is required.

Mr. MADIGAN. Mr. Blum, I do not know who you are. Are you with the Department of Energy?

Mr. BLUM. Yes, I work for Mr. Alm.

Mr. ALM. I have forgotten to introduce my two colleagues. Maybe this is an appropriate time. Dr. Ed Blum is Acting Director of my office dealing with scientific activities and Marilyn Herman is in my Office of Policy Coordination working almost full-time on gasohol matters.

Mr. BEDELL. Will the gentleman yield?

Mr. MADIGAN. Yes.

Mr. BEDELL. For industrial plants I think we are talking about anywhere from $20 to $40 million for plant construction. On-farm facilities run from $40,000 to $100,000.

Mr. MADIGAN. We are not talking about any assistance here for any kind of industrial plant, are we? We are in the Bedell bill, but we are not talking about that now.

Mr. BEDELL. No, this would not be a help in that regard. No.

Mr. MADIGAN. Dr. Blum, since the formation of the Department of Energy, I have been talking with people in various academic institutions across the country who are very much interested in energy research and development, as you might imagine. They all

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tell me that the Department of Energy has a nuclear bias. It seems to be opposed to even thinking about anything like gasohol development.

I do not want to have a closed mind on it but this response this morning, or rather this afternoon, reaffirms this to me. It is money you have not collected. You are going to allow individual operators of automobiles to be exempt from this. That does not cost the Department of Energy any money.

Then we are going to reach over here and establish loan programs in various agencies and departments, and we are going to siphon off some money, and we are going to allocate that for 100 little plants out there across the country. That will not do anything about the energy problem. We are not getting into the Department of Energy authorization at all, as I can see.

I calculate that I voted for over $10 billion for energy research and development since I have been in Congress. I am not aware of a penny of it going to anything like gasohol.

Now I see businessmen across the country without any help from the Government going out and developing this stuff and other people coming along and buying it and saying, "We will retail it", and other people like me coming along and saying, "We will buy it and consume it," and the Department of Energy is still saying, "It will not work."

If it will not work, why don't all these people out in the country know it won't work?

Is there a nuclear bias in the Department of Energy, and if so, why? What is the purpose of you coming up here and making a response to us like you are making today? What you are saying to us, the way I am taking it, is that you are still going to ignore gasohol and you are still not going to do anything about it. I would like to know why.

Mr. ALM. I, first of all, think that is a characterization I would certainly not agree with.

First of all, in terms of the funds, I do not believe you were here at the first part of the hearing when I mentioned that the funds for gasohol have gone up from $2 million to $19 to $24 million. In terms of total solar energy, the Department has gone up to $833 million on expenditures for solar energy.

Our nuclear budget is relatively flat. In fact, what is happening to our budget is that the non-nuclear categories are growing. The Department was charged by the President to conduct a domestic policy review of solar energy. That policy review which is before the President right now, I think contains some very comprehensive and useful options. I daresay it has been favorably viewed by those Members of Congress and outside groups interested in solar energy.

The fact is that the Department has an interest in a balanced national energy supply. We are looking to newer sources. I think we are looking with a freshness and a commitment that was not true in the past.

Mr. MADIGAN. How much of your budget is going to be devoted to gasohol, not in dollar terms but as a percentage of your research and development budget?

Mr. ALM. It is a relatively small portion. It is $24 million

Mr. MADIGAN. How relatively small? Is it 1 percent, or what?

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Mr. ALM. It is less than that. Of the about $3½ billion in R. & D. expenditures in our budget, and we are talking about $24 million.

Mr. MADIGAN. It is less than one-tenth of 1 percent, then.

Mr. ROSE. Excuse me, Mr. Madigan. I am trying to hold this to 5 minutes. We have 16 witnesses.

Mr. MADIGAN. I yield back the balance of my time.

Mr. ROSE. Mr. Glickman.

Mr. GLICKMAN. I would like to make a point partly in response to what Congressman Madigan said. We do not need an extensive of research and development in this field. We need to commercialize it. That is the whole point behind the Bedell bill which is to get it on-line. We are ready to get it into the gas stations now. If we get too bottled up on increasing the research part of the budget and not enough in increasing the supply and the allocation part of the budget, then we will never get it on-line.

That is the key point. You have changed your tune in the last year. I told you about that in the Agriculture Committee meetings. I don't know whether it is because you have a dedicated commitment to it or whether it is because you are using it for a cover for some of the more controversial pricing problems, but for whatever the reason, I applaud what you are doing and I think you deserve some defense because I have been on your back the whole time.

Mr. ALM. If it were a subterfuge for our pricing policies it certainly has not worked, I might say.

Mr. GLICKMAN. That is right. [Laughter.]

Let me ask you the following questions. Mr. Moorhead in the Banking Committee reported out a $2 billion loan guarantee bill for synthetic fuels, both biomass and coal. Mr. Bedell provides $600 million for synthetic fuels and alcohol fuels for loan guarantees. We have an amendment to the sugar bill that provides a similar amount for loan guarantees. Do you support a loan guarantee program for alcohol fuels and synthetic fuels?

Mr. ALM. In terms of alcohol fuels, at this time, the answer is no. Let me tell you why. I think you eloquently made the case about commercialization. That is the point I was going to make. The economics are good. If you are talking about a large plant and if the economics are good, it will attract private capital. If the economics are not good, then that is where you need the incentive. I think the economics are good.

Mr. GLICKMAN. I disagree with you. I think the crisis is such that we need some loan guarantee help. Congress has voted that down in the past. I hope that we will be able to pursue this.

Second of all, I have been told by many people that retail jobbers and suppliers are being precluded by their parent companies from offering gasohol because of quality control problems. The parent companies have indicated that they are going to take away credit card privileges of the retailers. They indicate that they are going to take the signs away from them. Are you aware of this?

Mr. ALM. We are aware of it, and we are looking into it.

Mr. GLICKMAN. I suggest you need to get your enforcement people out on that issue if, in fact, it is true. It may be a violation of Federal antitrust laws.

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Third, do you support mandating the phasing in of ethanol and other synthetic fuels into the refining process by Federal legislation?

Mr. ALM. We have looked at the issue of phasing in. That is under active study.

As you recall, the President directed us to look at further incentives for synthetic fuels. That is obviously one option.

Let me make the point again. At this point in time, as one looks at the market incentives, they look very favorable. Obviously, that would be a point in our consideration.

Let me make this point in order to be honest. As we look at this issue this may lead us to a conclusion that a mandate is not a good idea, but obviously our mind is not made up.

Mr. GLICKMAN. I visited a Ford Motor Company a few weeks ago and they are becoming very concerned that there may not be fuel for their automobiles. This morning when I was in line, I was number 16 in line to get gas at 7:15 in the morning. I saw a physical altercation break out almost behind me because of two people who thought they had the same place in line. I would suggest that synthetic fuels and liquid fuels are such priority that you would strongly consider that.

Finally, on the issue of rationing—even though we turned down the President's rationing plan, I fully expect that some authority will be given to him.

Have you thought about how you are going to treat gasohol or alcohol fuels or synthetic fuels generally in a rationing plan? Do you intend to give nonfossil fuels some priority in the mathematics?

Mr. ALM. I think I have commented to you before the House Science and Technology Committee that at that point in time I was ready to work on the implementing rules to make sure that happened. Unfortunately, I will not have that opportunity.

I personally feel that gasohol should be deducted. In other words, any allocation to a State should only include the gasoline portion and the extent to which gasohol was used in a State there would be an extra incentive.

Our concern with gasoline rationing is rationing of petroleum products and not the rationing of a commodity that produces automotive power.

Mr. GLICKMAN. Thank you.

Mr. ROSE. Are there other members who have questions? Mr. Daschle.

Mr. DASCHLE. On page 3 of your prepared statement you discuss the loan guarantees and other benefits for those who construct small scale plants. I am concerned about this. This is a reflection of what Mr. Glickman stated. I hope these will not be demonstration plants. We had someone here yesterday who clearly indicated that he is ready to go. He doesn't need to demonstrate the viability.

I am wondering if this is for additional grants to universities and colleges or if we can indeed use this specifically to give a farmer or an individual company the way of developing gasohol for retail purposes.

Mr. ALM. These grants and loan guarantees are to farmers and farm co-ops. They are not research and development grants.

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Mr. DASCHLE. How soon can we expect the first one to be granted?

Mr. ALM. We discussed this earlier. What has to be done is that Economic Development Administration and CSA have to develop the implementing regulations.

I indicated that I would meet with representatives of those two departments and get a schedule and get back to the committees.

Mr. DASCHLE. Thank you. That is very good.

On pages 7 and 8 of your prepared testimony you talk about anticipating the current level of production from 20 million gallons per year to 300 million gallons by 1982.

What I am concerned about is this. This is another point that Mr. Glickman raises. It relates to marketing. Right now 82 percent of all the retail facilities are franchises of major oil companies that have a prohibition in their contracts for marketing gasohol.

If that provision is maintained, I wonder whether or not the volume of gasohol which is predicted here, assuming you can statistically support that, can be marketed. I do not think it can.

Mr. ALM. There are two issues here. One is the general issue of prohibition of major oil companies trying to discourage the use of gasohol. That is something we are looking into.

The second issue is this. At a point and time when demand is sufficient merely selling gasohol at independent operations is not adequate. I think that is a possibility and is something that we ought to look into. I am not sure that a branded independent should be precluded from the use of gasohol.

Mr. DASCHLE. I am not so sure either. I think he is right now.

If that is the truth, would you support legislation which would prohibit that from occurring?

Mr. ALM. I would like to look into it first. My inclination would be to say yes.

Mr. DASCHLE. Could you provide the committee with a definite yes or no answer on that?

Mr. ALM. At some point in time. I would like to fully understand what the issue is first. If you are talking about for this particular record——

Mr. DASCHLE. Yes, I am.

[No response.]

Mr. HAGEDORN. If the gentleman will yield, let me pursue this. We are feeding the wrong end of the horse here. What is happening is this. With the gas tax subsidy we are trying to induce consumers to buy it. There is no problem at that end. The consumers' demand far outstrips the ability to produce it for now and in the foreseeable future.

Where it seems to me we need to provide the capital and incentive is in the area of building alcohol plants in order to produce this fuel. The Government should share in some of the risk against a calamity or if we run out of feedstock, or for whatever reason. They might be ordered to reduce their alcohol producing capacity. The Government would then share significantly in that in the cost of reducing production.

That is where we are going awry. Rather than plowing that money in to induce more consumers to use it we ought to be

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putting the capital up front in order to build the production facilities.

Mr. DASCHLE. Let me reclaim my time, if I may, to ask two additional questions. Then you can respond, Mr. Alm

I would like, if you could, a breakdown by percentage of your research and development for alternative sources of energy for the committee if you have not already been requested to do so.

[The above referred to material follows:]

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DOE FY 1979 APPROPRIATION AND FY 1980 BUDGET BY CATEGORY

Categories	FY 1979 Amount	FY 1979 % of total	FY 1989 Amount	FY 1989 % of total	Percentage Change
Defense Activities					
Atomic Energy Defense Activities	2,637,459		2,967,214		
Naval Petroleum Reserve	119,894		69,000		
Program Direction	50,787		58,974		
	2,808,140	25.2	3,095,188	37.3	10.2
Nuclear Non-Defense R & D					
Nuclear Sciences	29,700		32,000		
Basic Sciences	429,944		472,400		
Nuclear	1,116,416		938,449		
Magnetic Fusion	353,130		360,900		
Uranium Enrichment (Process Development)	100,000		83,430		
	2,029,190	18.2	1,887,179	22.7	- 7.0
Nuclear Non-Defense Other Than R & D					
Uranium Enrichment	- 121,768		- 219,542		
Uranium Resource Assess.	69,389		80,025		
	- 52,379	.5	- 139,517	- 1.7	-166.4
Nuclear Non-Defense - Support					
Program Direction	23,967		27,635		
	23,967	.2	27,635	.3	15.3
Non-Nuclear R & D					
Solar Applications	107,000		96,500		
Solar Technology	312,500		380,000		
Geothermal	156,200		139,000		
Biomass	41,600		55,500		
Hydropower	9,000		4,000		
Electric Energy Systems and Storage	98,000		91,000		
Basic Research	188,152		240,617		
Fossil Energy	748,485		735,516		
Urban Waste	5,000		-		
Geothermal Resources Development Fund	284		6,288		
	1,666,221	15.0	1,748,421	21.1	4.9

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Categories	FY 1979 Amount	FY 1979 % of total	FY 1989 Amount	FY 1989 % of total	Percentage Change
Non-Nuclear Commercialization					
Solar Applications	31,550		27,000		
Hydropower	19,000		14,000		
Coal Utilization & Supply	318		4,500		
Solar P D & D	28,381		28,500		
Alternate Fuels Loan Program	7,000		-		
Federal Leasing	1,000		2,000		
Shale Oil Development	2,300		5,000		
Oil and Gas Development	365		3,000		
	89,914	.8	84,000	1.0	- 6.6
Non-Nuclear Support					
Program Direction	29,928		35,360		
	29,928	.3	35,360	.4	18.2
Conservation R & D					
Buildings and Community Systems	69,850		70,900		
Industrial	34,640		30,400		
Transportation	96,000		93,445		
Appropriate Technology	8,000		8,500		
	208,490	1.9	203,245	2.5	- 2.5
Conservation Commercialization					
Buildings and Community Systems	12,575		10,000		
Industrial	3,160		9,800		
Transportation	1,200		2,555		
Energy Extension Service	15,000		-		
	31,935	.3	22,355	.3	-30.0
Conservation - Other					
State and Local	396,650		201,650		
Energy Management Partnership Act	-		110,000		
Energy Impact Assistance	20,000		-		
Inventor's Program	2,000		3,200		
Program Direction	12,315		14,845		
	430,965	3.9	329,695	4.0	-23.5

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Categories	FY 1979 Amount	FY 1979 % of total	FY 1989 Amount	FY 1989 % of total	Percentage Change
Environment					
Overview and Assessment..	51,550		60,600		
Biomedical and Environmental Research.	158,323		172,290		
Decontamination and Decommissioning.	25,200		32,400		
Program Direction.....	9,646		12,368		
	244,719	2.2	277,658	3.3	13.5
Compliance Activities					
Compliance (ERA).....	55,534		60,428		
	55,534	.5	60,428	.7	8.8
Regulatory Activities					
Coal Utilization.....	14,430		20,333		
Utility Programs and Regulatory Intervention..	19,593		30,694		
Regulation Development...	2,151		5,266		
Fuels Regulation.	6,269		5,166		
Emergency Preparedness...	30,637		32,600		
Hearings and Appeals.....	2,668		3,000		
Program Direction.....	1,451		2,159		
	77,199	.7	99,218	1.2	28.5
Power Marketing					
Alaska Power Admin.....	2,614		2,660		
Southeastern Power Admin.	1,253		1,400		
Southwestern Power Admin.	36,077		32,180		
Western Area Power Admin.	104,500		122,800		
Colorado River Basin.....	2,286		5,152		
Western Area Power Administration Emergency Fund.	200		200		
	146,930	1.3	164,392	2.0	11.9
Information Activities					
Energy Information Admin.	79,424		88,657		
	79,424	.7	88,657	1.1	11.6
Policy and Management					
Departmental Administration.....	251,584		307,829		
	251,584	2.3	307,829	3.7	22.4

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Categories	FY 1979 Amount	FY 1979 % of total	FY 1989 Amount	FY 1989 % of total	Percentage Change
Other Activities					
Strategic Petroleum Reserves	3,007,818		8,391		
Special Foreign Currency	2,000		-		
	3,009,818	27.0	8,391	.1	-99.7
Adjustments					
Supplementals	- 199,014		-		
Unobligated Balances	- 189,270		49,243		
Transfers to Other Agencies	4,332		-		
TOTAL DOE EXCLUDING FERC	10,747,627	100.0	8,349,377	100.0	
Federal Energy Regulatory Commission					
FERC	63,830		73,937		
Supplementals	- 12,530		-		
	51,300	.5	73,937	.9	44.1
TOTAL DOE	10,798,927		8,423,314		
		Construction			
Defense	354,400	3.3	448,000	5.3	
Non-Defense	556,699	5.1	496,340	5.9	
Total DOE	911,099	8.4	944,340	11.2	

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Mr. DASCHLE. Then on page 17 of your prepared statement you talk about the price at which you claim alcohol is currently selling, $1.20 to $1.50 a gallon, is about three times the price that I have heard in other testimony.

Could you also address that?

I also yield back my time.

Mr. ROSE. Without objection, the record will remain open at this point for the purpose of inserting this additional material.

[The above referred to material follows:]

The price of alcohol which we quote in our testimony is the current market price of biomass alchohol, not the cost of producing the product. The current market price of one major supplier of $1.59, is in part a response to an increased market for alcohol for motor fuel purposes.

The Department of Energy's analysis indicates that with improvements in technology and economies of scale, alcohol fuel costs can be reduced. Employing advanced available technology, optimized for energy and cost savings, ethanol could readily be produced for less that $1 per gallon if produced in a plant with as much as a 50 million gallon per year capacity.

Mr. ALM. Let me say this. What I am indicating here is our information with respect to selling price. You have probably been hearing figures in relationship to production price. Some figures obviously extrapolate into the future as to what production costs would be for new plants, but I will provide more information for the record.

Mr. ROSE. Thank you, Mr. Daschle. Mr. de la Garza.

Mr. DE LA GARZA. Mr. Chairman, I have no questions, but my only concern is that from the questioning it seems to me that members are inviting the intercession of the Energy Department and/or regulations from them with regard to gasohol.

Let me spare them. I think if they can produce gasohol, and sell it, and people would buy it, then keep the Energy Department out of it.

[Applause.]

No regulations, no supervision, no nothing. Just let Mr. Madigan's free enterprise system work.

Mr. ALM. Let me comment. The substantial elements of the program that I set forth create the basic economic incentives for the private sector to commercialize alcohol fuels. We do not have programs of grants and loans and complex kinds of things where the Government selects every technology. I share your sentiment.

Mr. DE LA GARZA. Thank you.

Mr. ROSE. Dr. Blum, are you aware of the ATF, the Alcohol, Tobacco, and Firearms Division's little booklet on gasohol? Are you familiar with their regulations dealing with this subject?

Mr. BLUM. I know the regulations in general, yes.

Mr. ROSE. Are you aware that to denature alcohol for sale it requires the induction of a chemical that is rather expensive but that if you want to denature alcohol to make gasohol for your own use, as opposed to selling it, then you can denature the alcohol with a gallon of gasoline? To me that is absolutely ridiculous to require that to sell it you have to introduce an expensive chemical before the denaturing process. But to denature alcohol for gasohol, that is for your own use, the gasoline itself is sufficient.

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It would seem to me that that is something that you should take note of and have some contact with the Department of the Treasury on. Would you do that for us?

Mr. BLUM. Yes, we will.

Mr. ROSE. We will have to go vote on the floor, so we will have a brief recess.

[Recess taken.]

Mr. BEDELL [acting chairman]. The subcommittees will resume their sitting.

We will call at this time Mr. Gale Shellito. Mr. Shellito, you may proceed.

STATEMENT OF GALE SHELLITO, PRESIDENT, SOLAR FUELS, INCORPORATED, RAPID CITY, S. DAK.

Mr. SHELLITO. Thank you, Mr. Chairman.

Mr. Chairman, today I am giving testimony before these committees. I will read my testimony.

I am president of Solar Fuels, Inc. from Rapid City, S. Dak. I have been a wheat and livestock operator all my life. I am testifying with the hope of seeing a new market open up for cereal-grain products.

Solar Fuels, Inc., is in the process of starting construction, pending contracts and Government redtape, to build a wheat processing plant that will produce motor fuel alcohol product, along with a protein product.

Solar Fuels, Inc., feels, by applying modern technology, we can build an economical alcohol motor fuel plant. We have accepted a design in which the fossil fuel energy for processing a bushel of wheat to alcohol is about 91,000 Btu. Comparing this to the 550,000 Btu required for potable alcohol, this design makes a motor alcohol plant about 75-percent thermally efficient—only slightly less than the approximately 80-percent thermal efficiency of petroleum refining for gasoline. Cryo Systems of Greenwich, Conn., is the designer and engineer.

This plant will process 34,000 bushels of wheat per day; run 330 days per year; 24 hours per day; 7 days per week, with an output of products of 100,000 gallons of ethanol alcohol—400 tons of feed protein meal per day.

When this committee, or Congress, considers a bill, there are five important things to consider:

One, the plants must be economically sound, not the poor risk type which would require funding by the USDA.

Two, plants must meet an energy balance equal to oil refineries or comparable plants.

Three, fuel alcohol must be quality controlled and blended properly for consumer protection.

Four, fuel alcohol must be produced at a price competitive with gasoline.

Five, plants must use a renewable resource—cereal grain grown annually—rather than a depletable resource, such as coal oil, et cetera.

Solar Fuels, Inc., is of the feeling that the Secretary of USDA is worried that we will create a market that will increase our prices to a level of the cost of production.

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Apparently, the USDA wants control of the amount of grain it supplies these plants. With this hand on agricultural cereal-grain products, the USDA can continue with their cheap food policy at the expense of the producer.

The consumer need not worry that we are going to use up the cereal-grain for alcohol. We are producing a fuel to grow more food and to enable us to become less dependent upon foreign crude. In addition to the production of alcohol, the wheat and corn processing plants produce protein suitable for livestock and human consumption. For the production of alcohol, we are extracting only the starch—a carbohydrate, or fat—which is not essential in a balanced protein diet. Feedstocks need not be guaranteed by the USDA.

We are told there is a surplus of grain and that is why cereal-grain prices are below the cost of production. We have a set-aside program today because we are overproducing.

Why is this committee providing for a secure supply of feedstocks for the operation of alcohol fuel plants? Producers will produce as long as there is an incentive to do so. They will not continue to produce at below the cost of production. There is a prime example—beef production is down because prices over the last 4 years were below the cost of producing.

Why does the Secretary need to have a reserve supply of distilled grain? Does the Secretary want to be in the protein business competing with the producer of the product, or is this another attempt to maintain the Secretary's cheap food policy? With continued attempts like this, the Secretary is nailing the lid on the coffin of the producer.

Let's put incentive back with the voting public to own the alcohol fuel plants without the controls, red tape, and tons of paper work to justify jobs in the USDA. Let's get back to square one—productivity and efficiency.

There are three things needed in the success of these plants: (1) money, (2) marketing, and (3) management. There are qualified people outside of government bureaucracy to carry out this program.

Solar Fuels, Inc., feels that for proper quality control and the most economic and efficient use, alcohol should be blended into gasoline by refineries where specially tailored base stocks will give the proper product quality and protection to the motoring public.

Solar Fuels, Inc., has letters-of-intent from purchasers for the alcohol products from its plant. They are with Sinclair Oil Co., Denver, Colo.; and Husky Oil Co., Cheyenne, Wyo. We also have a letter-of-intent from Loomix Co., Arroyo Grande, Calif., to purchase the feed protein meal.

The act states that the Secretary of Agriculture will receive 1 cent for each gallon of alcohol produced by these plants. This 1 cent should stay with the plant for future improvement, research, and market development.

Solar Fuels, Inc., feels that alcohol fuel plants should not be subsidized by the USDA. Plants should not be built that are economically unsound, for instance, poor loan risks. Plants can be built that are economical. Free enterprise should be doing this, not the USDA.

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Alcohol has been used for years. Why does the USDA spend millions of tax dollars for more research to justify the production of alcohol? Why should this committee even consider letting this happen to the taxpaying public?

Solar Fuels, Inc., would like to see this committee work with cereal-grain and livestock producers to achieve a simple loan guarantee with the financial institutions in the area where plants are to be built. Federal loan guarantees to the banks would enable the local communities to prosper and the general public in these communities to participate in the ownership of the plants. As an example, this could be accomplished on a local basis through the FHA with approximately 300 to 400 participating shareholders.

Thank you, Mr. Chairman.

Mr. BEDELL. Thank you, Mr. Shellito.

[The attachment to Mr. Shellito's statement is held in the subcommittees' file.]

Mr. BEDELL. Mr. Madigan.

Mr. MADIGAN. Mr. Shellito, on the question of research and development, the Department of Energy has said, and I quote them verbatim, "Gasohol is Twentieth Century alchemy." They say that because they claim it takes as much energy to make gasohol as you are able to derive from the gasohol once made.

That is what the Department of Energy said. They did not say it here this afternoon but that is what they say before the committees of Congress.

If it takes as much energy to produce it as you are able to derive from it, then it would seem to me that it is a technology still in need of further research and development. That would seem to suggest to me that that calls for further expenditure of research and development funds by the Federal Government.

Do you agree or disagree with that?

Mr. SHELLITO. I disagree with that.

Mr. MADIGAN. Please explain.

Mr. SHELLITO. We have used alcohol for a good number of years. Our military used it in World War II. It has been proven that it is feasible to use alcohol. We have had tests run. The tests have been reported by the Nebraska people.

The Department of Energy is talking about 550,000 Btu per bushel plants—the old portable plants that are in existence today. If you will check, the people of ADM are using a new design that is not costing near that to derive that 550,000 Btu per bushel. When they consider 550,000 Btu's per bushel, they are using the figures that they are processing drinkable alcohol. There are ways of producing alcohol today and not taking the aldehydes out and it does not bother the motor to have these other things in. It is not drinkable if you leave it in, however. When you are talking about processes that can be developed, there are processes that will work. ADM has one of the better ones.

Mr. MADIGAN. That is in my district. They say they need help from the Government. I just talked to them Friday morning.

Mr. SHELLITO. What kind of help do they need?

Mr. MADIGAN. I do not know. I did not talk to them that long.

Mr. SHELLITO. I am sure it is not financial.

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Mr. MADIGAN. I had the impression that that is what they were suggesting. I don't know what else they would want.

Mr. SHELLITO. I believe they just expanded their operation. They are in the high fructose business. Our process is in the same order as the high fructose plant. They are taking the excess starch out of their fructose plants and making alcohol. They go one step farther in making high fructose sugar. They turn the glucose into fructose and they substitute sugars.

Mr. MADIGAN. Then they take what is left over and make gasohol?

Mr. SHELLITO. That is correct.

Mr. MADIGAN. You don't think they need any help from the Government to do that?

Mr. SHELLITO. That is my own personal opinion. ADM is a very large corporation.

Mr. MADIGAN. Mr. Chairman, I thank you.

Mr. BEDELL. I think you have made one good contribution here in the addendum to your testimony. Really, if we are going to consider the cost of gasoline at the pump we should be considering the cost of the gasoline at the pump from crude oil that we are importing. Any additional production we are going to have is going to be from additional crude oil at world prices. That is a significantly higher price than the present average price of gasoline at the refinery. I think that is a very important point. This makes gasohol even more economical and practical.

Mr. SHELLITO. Mr. Chairman, when you consider the cost of OPEC crude compared to the cost of domestic crude and the price difference there, it is astounding.

Mr. BEDELL. I am sorry but we will have to recess the hearing briefly because we have to go vote again on the floor.

[Recess taken.]

Mr. ROSE. The committees will come back to order.

We will now invite Congressman James Abdnor from South Dakota to testify.

STATEMENT OF HON. JAMES ABDNOR, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF SOUTH DAKOTA

Mr. ABDNOR. Mr. Chairman and members of the subcommittees, as a cosponsor of H.R. 2053 and H.R. 3983, I am appearing before you today to lend my strong support to the production of gasohol, in which there is much interest in my own State.

With me today are representatives of two such interested groups: Roger Barber, president of Northern Agri-Fuels, and Gale Shellito, president of Solar Fuels, Inc. Furthermore, I was contacted just last week by a group who plan to build a gasohol plant in southeastern South Dakota by late 1979.

Since the time when I cosponsored H.R. 2153, Congressman Bedell has introduced a revised version, H.R. 3905, and my own views on how to initiate a national program have become more clearly focused as well.

The South Dakota Department of Energy tells me that the lack of alcohol plants in South Dakota adds about 5 cents worth of transportation costs to every gallon of gasohol sold in the State. The real problem in producing the alcohol presently, Mr. Chair-

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man, is plant capacity; and the problem with increasing the number of plants is securing the capital.

Consequently, last week I cosponsored Mr. Sebelius' bill, H.R. 3983, which I understand has been inserted in the Rural Development Act, which provides loan guarantees to plants producing alcohol and industrial hydrocarbons. This legislation puts gasohol in a proper perspective and addresses the real needs of the alcohol producers.

First, this bill does not drastically change the farm program. The approach here would be to let the natural functions of the market, because of a greater number of plants, increase the demand for, and hopefully the price of, agricultural commodities.

Second, the Government would not be involved in buying the fuel crops from the farmers and then selling these commodities to plants at 80 percent of the cost to the Government. The gasohol people in my State tell me they do not need this 20-percent subsidy, as surprising as that might be. But, if you choose to go that route the subsidy program should be optional for the Secretary to apply when he deems it necessary to protect the Government loans from default.

The third major advantage of the Sebelius bill is that it would not regulate the sale of distiller's dried grain—DDG. The dollars from the sale of this byproduct are no small matter. It is the money raised from this protein that makes gasohol production price competitive with conventional fuels.

My constituents tell me that if it is a question of the 20-percent commodity subsidy and the DDG regulations, or neither, they would rather have neither. I do not feel that we can justify the economic disadvantage in which the alcohol producers would be placed by regulating the DDG.

I might make a suggestion about the Sebelius bill. As has been pointed out in yesterday's testimony, alcohol for fuel may be derived from anything from cheese whey to urban garbage. If this legislation is to be truly a national gasohol program, it must reach beyond the provincial interests of any one group, and encompass all the viable alternatives. By writing this legislation so that it may be tailored to each region's available alcohol source, a truly viable program may evolve.

Overall, our goal on gasohol should be to maximize the ability of the country to produce this gasoline extender with a minimal amount of government regulations. Mr. Chairman, by integrating the concept of utilizing excess agriculture production capacity to reduce our foreign oil dependence, which is contained in the Bedell bill, is excellent and could not be more timely.

In my view, however, the loan guarantees contained in the Sebelius bill are the most efficient means to achieve this goal. Furthermore, this concept was reported out of the House Agriculture Committee yesterday as an amendment to the rural development bill, and Senator Dole has made a similar amendment to a piece of legislation on his side.

Mr. Chairman, I would now like to close by introducing to the committee two men that have extensive involvement in gasohol production.

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First, you have already met Mr. Gale Shellito, a farmer-rancher from the Black Hills area of western South Dakota, who is the original incorporator and president of Solar Fuels, Inc. The Solar Fuels plant will be located near Rapid City, S. Dak. adjacent to the Chicago Northwestern Railroad and Interstate 90. The plant expects to employ 55 to 60 employees, and begin operation in the spring or summer of 1980. Once production begins, the plant will produce 400 tons of high protein meal, and 100,000 gallons of 200-proof ethanol daily.

The second South Dakotan I would like you to meet is Roger Barber, president of Northern Agri-Fuels of Rapid City, which is a nonprofit group formed by local farmers and ranchers. They developed the feasibility study from which the Solar Fuels plant is designed as well as several other plants in the planning state in the Midwest.

Mr. Chairman, thank you very much. I would like to introduce at this time, Mr. Barber.

Mr. ROSE. Thank you. Mr. Barber, you may proceed.

STATEMENT OF ROGER BARBER, PRESIDENT, NORTHERN AGRI-FUELS, INC., RAPID CITY, S. DAK.

Mr. BARBER. Thank you, Mr. Chairman.

My family has been engaged in farming and ranching for a total of 75 years in South Dakota.

I am testifying in hopes that Northern Agri-Fuels can shed new light to this committee on the production of ethanol alcohol from cereal grains, a renewable resource. And besides creating new markets for grain, help with the energy crunch now in progress.

Northern Agri-Fuels Research & Development, Inc., was organized under the laws of the State of South Dakota as a nonprofit corporation in August 1978 by a few concerned agricultural people who wanted to do something about the problem facing the agricultural industry.

The purposes of Northern Agri-Fuels as stated in the articles of incorporation are: One, to generally promote the creation of new markets for agriculture products through research and development; Two, to conduct a study into the feasibility of the manufacture of alcohol from farm products; and Three, to promote and encourage the use of an alochol-gasoline blend of fuel in motor vehicles.

Northern Agri-Fuels has been solely funded by its memberships to date, and hopes to stay away from any type of Government funding. Memberships into NAF are $250, and as of May 8, 1979, NAF has 426 members. With funding only from its memberships, NAF will be controlled by the farming community, working to promote the agriculture industry.

Northern Agri-Fuels at present helped Cryo-Systems sell eight other feasibility studies in five States, and one in Canada. With interest from the Canadian Government and wheat boards it looks like it could be the first plant in operation in late 1980.

I think it is a shame that the farmers of America are so efficient that they have to cut production 20 percent and produce the other 80 percent below production cost.

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The persons that would benefit the most would be the consumers in America. With the modern technology applied by Cryo-Systems in these plants, we can use a renewable resource to produce a product that would cut pollution 30 to 50 percent, plus increase protein and decrease our dependence on foreign oil.

For every gallon of ethanol alcohol we can produce, we can back out 1.8 gallon of foreign crude. This would be a great help to the trade deficit.

Northern Agri-Fuels would like to see 30 plants producing ethanol alcohol constructed in the Midwest. These plants would operate on the 20 percent set-aside now being wasted by the Federal Government. This would also back out 1,782 million gallons of foreign crude per year.

It is clearly the responsibility of Congress to insure the ethanol alcohol concept be reviewed properly for the benefit of all our citizens in the years ahead.

A special Department of Energy task force was established to address the potential of alcohol fuels.

The major findings of the task force were:

One, the high costs of alcohol fuels relative to conventional sources of petroleum are the major obstacle to widespread commercialization. This is not true, it can be produced for less than the price of gasoline.

Two, loss of energy: This is false. With the new concept developed, one gallon of ethanol alcohol can be produced with less than 70,000 Btu's.

Three, alcohol fuels are suitable fuels for the internal combustion engine, gas turbine peaking units, utility boilers, industrial heating, and fuel cells.

These findings represent a preliminary assessment. While considerable progress has already been made, the Federal Government is currently conducting an intensive review of alcohol fuels with special emphasis on the utilization of a diverse number of feedstocks for alcohol production.

If support from government agencies matched that of Congress, we would be making much more progress in developing alcohol-producing plants. The use of alcohol as a motor fuel represents a totally different approach to energy conservation and had not been given a high priority. An inordinate amount of attention has been given to other forms of energy at the expense of alcohol fuels produced from renewable resources.

Northern Agri-Fuels is in hopes that all ethanol alcohol will be sold to petroleum companies so it can be blended properly for the protection of consumers. This is a very acceptable product to the oil companies.

I would urge these committees and Congress, today, with no further delay, to make loan guarantees to plants of this nature, immediately, for the good of all America with no Government redtape or ties to the Department of Agriculture.

Thank you.

Mr. ROSE. Thank you.

Let me point out to my colleagues on the committees and to those witnesses who have yet to testify that the hour is getting late. If it is at all possible for us to cut our questioning down and

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not replow ground that we have been over before, it would be very helpful.

I want to move this legislation. I do not want to make a career out of it. Regardless of whether I would like to see it pass or whether I will support it. I want to speed up this process. I certainly do not want to cut off new information that people want to bring to us, but in your presentations and in your questions please try to help us with out problems here.

Are there questions? Mr. Hagedorn.

Mr. HAGEDORN. Mr. Barber, you mentioned in your testimony that you could produce a gallon of ethanol for 70,000 Btu's. What is your fuel source?

Mr. BARBER. Feedstock or fuel source?

Mr. HAGEDORN. Yes.

Mr. BARBER. That is with either using electricity with a backup of coal or fuel oil, No. 6 fuel oil.

Mr. HAGEDORN. And you have determined you can produce it efficiently on a net-plus basis?

Mr. BARBER. Yes. It is 75 percent efficient compared to 80 percent for oil refineries.

Mr. HAGEDORN. Have you considered using any waste residuals, straw, or stalks?

Mr. BARBER. We are looking into that to cut the cost but this first plant that will be built in Rapid City will be fueled by these resources.

Mr. HAGEDORN. Thank you.

Mr. ROSE. Thank you. Mr. Bedell.

Mr. BEDELL. Let me clarify one thing that was mentioned both by Congressman Abdnor and Mr. Shellito. My bill does not mandate that the Secretary will buy the DDG from the producer. It says that if a sale price is mutually agreed upon and if the producer wishes to sell his DDG then he may do that. The purpose of that is so that we would not disrupt the possible market for soybean meal.

Mr. ROSE. Mr. Daschle.

Mr. DASCHLE. Let me welcome these gentlemen. Also, I want to follow up on page three of the written testimony of Mr. Barber. You recommend that the petroleum companies be provided the ethyl alcohol for properly blending the fuel and that this is an acceptable product to them. I am really glad to hear that. The perception that I have had, judging from the comments made by the chairman of the board of Phillips 66 and Atlantic Richfield and Chevron have all indicated that they see great difficulties with ethyl alcohol and are very much opposed to production right now. Do you have evidence that they are in support of marketing ethyl alcohol?

Mr. BARBER. Solar Fuels has in its possession contracts from oil companies to produce it. If I had 2 million gallons of ethanol alcohol I could sell it to the major oil companies. We have those contracts in hand. We have contracts for the feed byproducts. I should mention that this is a very superior product even to soybean meal. It has been tested by the feed companies and this is what they are telling us.

Mr. DASCHLE. Can you provide me with some information on that? I would like to follow up on that.

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Mr. BARBER. Yes, I can.

Mr. DASCHLE. Thank you.

Mr. BARBER. Let me add this. If you want to talk about price, we can produce it and sell it for 20 cents and make a very healthy profit per gallon.

Mr. DASCHLE. I believe that.

Mr. BARBER. It is a new process. It has nothing to do with the old processes. It is a whole new light that has come in.

Mr. DASCHLE. Thank you. Thank you, Mr. Chairman.

Mr. ROSE. Are there any further questions? If not, we will excuse you gentlemen, and we thank you very much for being here.

Are there any witnesses in the audience who have planes to catch between now and 5 o'clock?

I understand our colleague, Congressman Fithian, is personally acquainted with Dr. Tsao.

Mr. Fithian, I yield to you.

Mr. FITHIAN. I thank the chairman for yielding. I will be brief. Dr. George T. Tsao from Purdue University has been doing the major work in the country on cellulosic hydrolysis, the conversion of cellulosic waste material to ethyl alcohol. I would note in introducing the distinguished professor that the Battelle Corp., in evaluating his work for the Department of Energy, has in final summary of their evaluation indicated that Dr. Tsao's work was the most startling development in cellulosic chemistry since that field was discovered over 200 years ago.

His work is the most exciting thing I have followed since I have come to Congress, and I think it is the major breakthrough in this whole field. I want to welcome him personally this afternoon.

Mr. ROSE. Thank you.

Dr. Tsao, you may proceed.

[The prepared statement of Mr. Tsao follows:]

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Professor George T. Tsao, Director
Laboratory of Renewable Resources Engineering
Purdue University
West Lafayette, Indiana 47907

In my testimony, I will first describe briefly the pertinent technology of alcohol production, which will help answer some of the questions regarding net energy balance, protein byproducts, technology readiness, and others. Towards the end, I will then make a few personal comments on the overall picture of alcohol as a liquid fuel. Accompanying my written testimony, a set of diagrams has been provided. I will refer to these diagrams as I read my testimony to help explain some of the points I wish to make.

The overall process of alcohol production can be divided into three steps shown in Diagram 1: (1) Conversion of raw material such as grain corn into fermentable sugars, (2) Fermentation of the sugars into alcohol, and (3) Isolation of alcohol from the dilute, watery fermentation broth to make the final liquid fuel. When grain corn is used as the raw material, the overall process is similar to that of producing whisky. The similarity between whisky production and gasohol production should stop right here. However, due to lack of research, and thus new technology, today we are still using the process that has been developed for whisky production in producing liquid fuel. When a process that is meant to make a product that sells at five dollars per fifth is used to produce liquid fuel worth about one dollar per gallon, the problem of inefficiency is unavoidable. One common criticism often leveled against gasohol is the statement that "More energy is spent in producing alcohol from grain than the energy the final alcohol contains." This statement, unfortunately, is often true. Of course, we can argue that this country is short of liquid fuel for which we spend nearly 50 billion dollars per year to import. If we use our solid coal to produce liquid alcohol, we can solve some of the problems of

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trade imbalance and also the problem of surplus of grain corn. What is in shortage in this country is indeed liquid fuel. We have huge deposits of coal which can last several hundred years. In spite of the mishap of Three Mile Island, we still have a large nuclear energy capacity. The liquid fuel for the seemingly endless American appetite for highway driving is what we should do something about immediately. Production of alcohol from grain corn can potentially be very energy efficient, but research is needed to develop such new technology. As far as I know, there is no federal money presently designated for grain alcohol research. One of the energy consuming operations in grain alcohol production is the disposal of fermentation "slops." Current practice is to use the slops for feeding animals. Unless one can find large enough animal feedlots near the alcohol factory, the slops have to be first dried to produce the "stillage grain" to be shipped to the market. Since the fermentation slops are rather watery, the drying is a major energy cost. Instead of the current practice, we should do research to develop a process shown in Diagram 2. Grain corn contains 4 major components: oil, protein, fiber, and starch. Starch is the component that can be saccharified to fermentable sugars which are responsible for alcohol production. Protein and fiber, in the current practice, make up the bulk of stillage grain. In a new process, we should first of all isolate corn oil from grain corn to obtain a good by-product credit to help pay the alcohol production cost. Secondly, corn protein should be isolated for marketing as animal feed. This type of corn protein feed is essentially the same as that currently produced by the corn wet milling industry. After oil and protein are taken care of, both fiber and starch can be converted for alcohol production. By then, the new "slop" is only a lean liquid and can be

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used for methane generation. The process in Diagram 2 thus will do away with the current drying cost. There are industrial processes similar to that in this Diagram. The process known as "corn wet milling" is currently used to isolate oil, protein and fiber. The wet milling process however, is also very energy intensive and ranks as the second most energy consuming among all food industries. We are doing research at the Laboratory of Renewable Resources Engineering of Purdue University to develop an alternative process of direct starch extraction. Unfortunately, as of now, we still don't know whether or not we will have funds to continue our work in this area.

The most energy intensive operation in the current production of grain alcohol is for isolation of alcohol. Distillation is the current practice which consumes 60 to 80% of the total energy in alcohol production. Current technology requires fractionation distillation with a high reflux ratio, or in layman terms, repeated vaporizing and condensing the alcohol to gradually increase its strength to about 190 proof. Two additional distillation steps are needed afterwards to bring it to 200 proof and to recycle the so-called "azeotrope breaking solvent." The distillation principle is practiced in whisky making also. When heated, the more volatile alcohol vaporizes but water, even though less volatile, vaporizes also and thus consumes extra energy. By condensing the vapor mixture, the more volatile alcohol is enriched in the condensate. Repeating the cycle of vaporizing and condensing will gradually increase the alcohol strength. There is, however, a situation of diminishing return. One can easily bring a dilute fermentation broth containing about 10% or 20 proof alcohol to 160 proof in a few cycles with little energy consumption. To go

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from 160 proof to 190 proof, many more cycles and thus much more energy is needed. We at the Laboratory of Renewable Resources Engineering of Purdue University are investigating a process of distilling the alcohol to 160 proof only and then bringing it to 200 proof by dehydration agents to remove the residual water. The energy consumption by this process is estimated to be about 10% of the current practice. Our work, as of now, receives no federal funding support.

I can go on to describe additional energy saving measures to improve the efficiency in grain alcohol. The point I wish to make is that we are currently applying what I call whisky technology in producing alcohol fuel from grain. After some research, the problems of energy imbalance, protein byproducts and others can all be solved. The immediately required studies are rather straight forward. But, we do need funds in order to do the work. The Laboratory of Renewable Resources Engineering of Purdue University has an interdisciplinary team of over 40 researchers with expertise in engineering, chemistry, fermentation, microbiology, food science, and so forth. If we are given a contract of 1.5 million dollars today, we can finish the necessary research in 18 months. By then, i.e. near the end of 1980, we will have sufficient test results for designing grain alcohol factories based upon new energy efficient processes. For many years, we have not plowed the field of alcohol research, today we simply do not have a process for alcohol fuel production.

American farms can produce a grain corn surplus of about one billion bushels or 28 million tons per year, which can yield 2.5 billion gallons of liquid alcohol worth more than 3 billion dollars. With the currently set-aside land and new plantations, it has been estimated that this country can potentially triple its grain alcohol production making an annual capacity of

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about 7 billion gallons. Current U.S. gasoline consumption is about 120 billion gallons. Therefore, grain alcohol can be a significant even though not a major source of liquid fuel in the future.

Grain alcohol is only one small part of the overall potential of alcohol production from biomass. Besides starch, there are a number of other natural materials that can be converted into fermentable sugars and then alcohol. The 3-step process in Diagram 1 also applies to other natural materials as shown in Diagram 3. Fermentable sugars can be derived from starch in grain corn; fermentable sugars can also be derived from cellulose and hemicellulose in a large number of currently not utilized materials including cornstalks, wheat straw, sugarcane bagasse, sawmill rejects, industrial packaging residues, logging residues, animal feedlot wastes, city trash, and the like. As shown in Diagram 4, the United States has annually over 1000 million tons of such available cellulosic residues comparing with the total annual corn production of 180 million tons or 6.3 billion bushels. Unlike grain corn, the cellulosic residues are not currently marketed as food or feed products. Due to economical, agronomical and other constraints, however, only one third to one half of the available cellulosic materials can be considered collectible for conversion into alcohol. On the other hand, large areas of marginal land and water surface not suitable for corn production can be cultivated to produce such things as Johnson grass,tall fescue, cattails, and other unknown and untested plant species. In addition, forest research not for timber or pulp production but for cellulosic biomass may bring about fast growing trees like the Brazilians are achieving.

Practically all the above mentioned cellulosic materials contain 3 major components. In addition to cellulose, there are also hemicellulose and lignin.

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Conversion of cellulose into fermentable sugars is not new. Previously, the most economical process could only give a yield of about 50% conversion (i.e., about 50 pounds of fermentable sugars from 100 pounds of cellulose). Cellulose is difficult to convert due to two reasons: (1) its strong crystalline structure and (2) protection by the cementing agent lignin shown in Diagram 5. We at Purdue University have used a solvent to dissolve cellulose, whereupon the two obstacles are both removed as outlined in Diagram 6. Consequently, the work by us at the Laboratory of Renewable Resources Engineering of Purdue University has resulted in a near 100%, complete conversion of cellulose into fermentable sugars. Furthermore, we have also successfully developed a laboratory process to convert hemicellulose into fermentable sugars and then also liquid alcohol. In total, we can obtain about 100 gallons of liquid alcohol from each ton of cellulosic material. Assuming that 500 million tons per year of cellulosic materials can be made available for alcohol production, the potential annual capacity is 50 billion gallons of liquid fuel. This volume compares with the potential annual capacity of grain alcohol of 7 billion gallons and with the annual gasoline consumption of 120 billion gallons in the United States in Diagram 7.

The Purdue researchers are now conducting laboratory studies of the production of alcohol from cellulosic wastes and also conducting scale-up research on the process. We need additional funds to carry our work into the next phase of Pilot Plant Demonstration. If we are given today a contract of six million dollars, we can complete demonstrating an energy efficient, overall process of alcohol production from cellulosic materials by 1981.

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As shown in an early diagram (Diagram 3), the major difference between the processes of grain alcohol and cellulose alcohol production is only the 1st step of the 3-step overall process. A factory built for production of alcohol from cellulosic materials such as cornstalks can be used to carry out simultaneous production of alcohol from grain such as corn. The change over causes essentially no disruption in the plant operation. The cellulose alcohol factories, once built, can be used as a "safety valve" for the farm commodity market. This term "safety valve" is borrowed from my friend, Mr. Floyd Fithian, the Congressman from our Indiana Second District. What this means is the cellulose alcohol factories once built can also use up all the surplus corn and wheat whenever there is a surplus and thus prevent it from developing. This safety valve will help maintain a stable price on the commodity market. These cellulose alcohol factories do not rely on surplus grain as the sole raw material and are thus free from the fluctuation of grain supply. Cellulosic materials such as cornstalks and wheat straws are bulky and light in weight. These are not the materials that we can afford to transport over long distances. Consequently, alcohol production factories need to be decentralized. To take advantage of the existing highway and railroad systems for transportation, small and medium sized alcohol factories are to be built in association with farm co-ops and grain elevators. On the other hand, alcohol production is an industrial operation that requires the care of professional skills and also the necessary scale to be efficient. Therefore, I simply do not believe that alcohol fuel production should be or could be a part of an average farm. My estimate is that one needs at least 50,000 tons of raw materials or 5 million gallons of alcohol per year to be efficient and competitive.

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For the past 25 years, I have lived 17 years in first Illinois, Iowa and then Indiana and I have heard talks of gasohol every 3rd or 4th year because apparently every so often there has been a corn surplus. Meanwhile, for 25 years I have not seen any rush of building grain alcohol factories. Obviously no industry including the alcohol industry can rely on a raw material that is only available once in 3 or 4 years. Fuel alcohol can only be categorized as a bulk chemical of low profit margin once the supply and demand and its business structures are well established. In other words, fuel alcohol is not the kind of product that can tolerate wide fluctuations in the cost of its raw materials. I would think that the fluctuating nature of corn supply could be the major impedance of a widespread grain alcohol production. How are we then going to provide the necessary stability? Government control is one possibility. For this, we will need some how to distinguish between grain for alcohol and grain for food and feed and, of course, to police the situation. Another possibilty is to first develop the technology and then build alcohol factories based upon cellulosic materials which, unlike grain corn, are stable in their supply. Once the factories are built, they will serve as the "safety valve" as Mr. Floyd Fithian has proposed to absorb surplus grain whenever necessary. This could be a more natural way of inducing grain alcohol production.

Finally, there is the problem of profitability of alcohol. With today's technology, grain alcohol can be produced at about $1.10 to $1.40 per gallon depending upon the raw material and plant efficiency. The cellulose alcohol industry does not yet exist and thus we can only talk about estimates of its cost. My estimate is that liquid alcohol can be produced at about 85 cents per gallon from cellulosic wastes. In any case, the cost of liquid alcohol production today is still much higher than that of gasoline which is about 50 cents per gallon. With such a cost difference, how are we going to bring alcohol fuel

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into reality? I think we can do one of several things. One is to leave alcohol alone and do nothing and to wait until the petroleum price goes up. Judging from the speed that the gasoline price has been going, there may not be a very long wait before alcohol becomes competitive on its own. Meanwhile, while we are doing nothing, we are paying about 50 billion dollars per year or about 140 million dollars per day or about 6 million dollars per hour to import petroleum. Why don't we do something to help along the alcohol production which can potentially be a major source of liquid fuel? Whatever subsidy that the government gives to alcohol, it will help create jobs at home. Federal government spends huge sums of money to create jobs which are often really non-jobs but welfare in disguise. Alcohol related jobs are real jobs that help us to do away with land set-aside programs, to become less dependent on foreign countries, to stop a part of the dollar drain and most of all to restore some of the lost pride.

One of the explanations often given by government officials for their lack of enthusiasm towards gasohol is their projection that the contribution of alcohol from biomass to our future liquid fuel is rather insignificant. I have heard many different estimates on the percentage of our total liquid fuel that can be derived from farm commodity and other renewable resources. I believe that the lowest estimate that I have ever heard is 7%. Notwithstanding the accuracy of this estimate, even a 7% of our liquid fuel supply is still something very significant, because 7% of our annual petroleum consumption is actually about 350 million barrels worth more than 4 billion dollars.

American energy consumption is indeed enormous. In previous years, most of our energy needs relied on essentially one single item, namely petroleum. Today, we are learning some painful lessons. We will need all possible sources including nuclear reactors, oil shale, coal, farm commodity and other renewable resources as well as petroleum to meet our energy needs in the near and distant future.

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President Carter said two years ago that we should all consider the energy crisis the moral equivalent of war. As an engineer, I am ready and am doing my part of the battle. However, as my research program gets more intensified, I have found that I need to spend increasing amounts of my time worrying about and seeking for continued support of funds for my work rather than doing the actual research itself. I come to Washington, DC often. Frankly, I do not detect any war-like morale in this powerful government of ours in handling energy matters. While we are wading through the thick of government rules, regulations and interpretations, we are losing our energy war at a rate of 6 million dollars per hour to pay for import petroleum. When I received the letter asking me to come here to testify, a list of questions was also given, asking, among other things, what impediments now exist for a widespread use of alcohol fuel. I have good faith in American scientists, engineers, and technologists. I have only good words to say about the productivity of American farmers. What seems to be an impedance is the time lag being far too long between law making at one end and the physical things that engineers and farmers actually do on the other end. Mr. Chairman, if you can make it a part of the new law requiring full implementation of the new law within a time limit, the rest of the alcohol fuel program, I believe, can be well taken care of by the American people.

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DIAGRAM 1

RAW MATERIAL → SACCHARIFICATION → FERMENTABLE SUGARS → FERMENTATION → ALCOHOL IN BROTH → ISOLATION → ALCOHOL FUEL

OVERALL PROCESS OF ALCOHOL FUEL PRODUCTION

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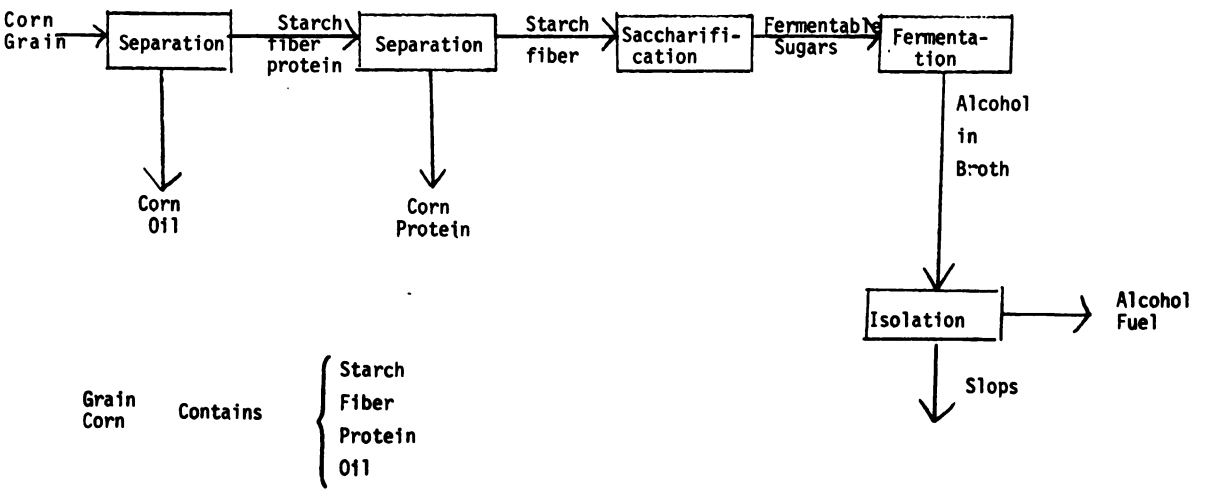
Diagram 2



A Process of Grain Alcohol

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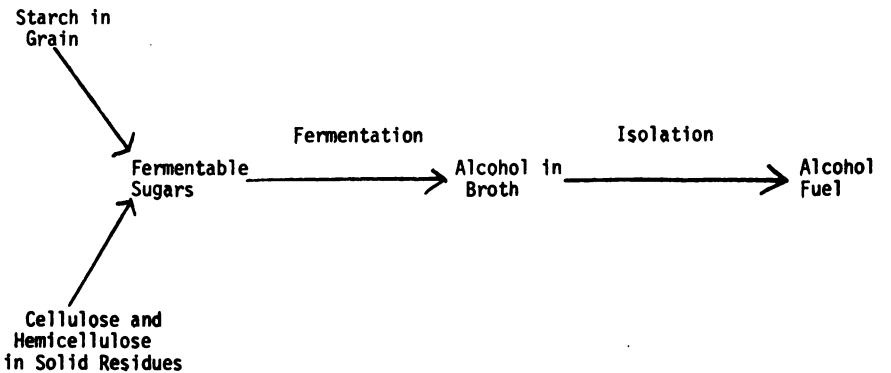
Diagram 3



Biomass for Alcohol Fuel

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Diagram 4

Cellulosic Residues	1010 Million Tons Per Year
Grain	
Corn	180 Million Tons Per Year
Others	180 Million Tons Per year

Biomass Availability

Diagram 5

Two Obstacles to Cellulose Conversion:

(1) Strong Crystalline Structure of Cellulose

(2) Protective Seal of Lignin

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Diagram 6

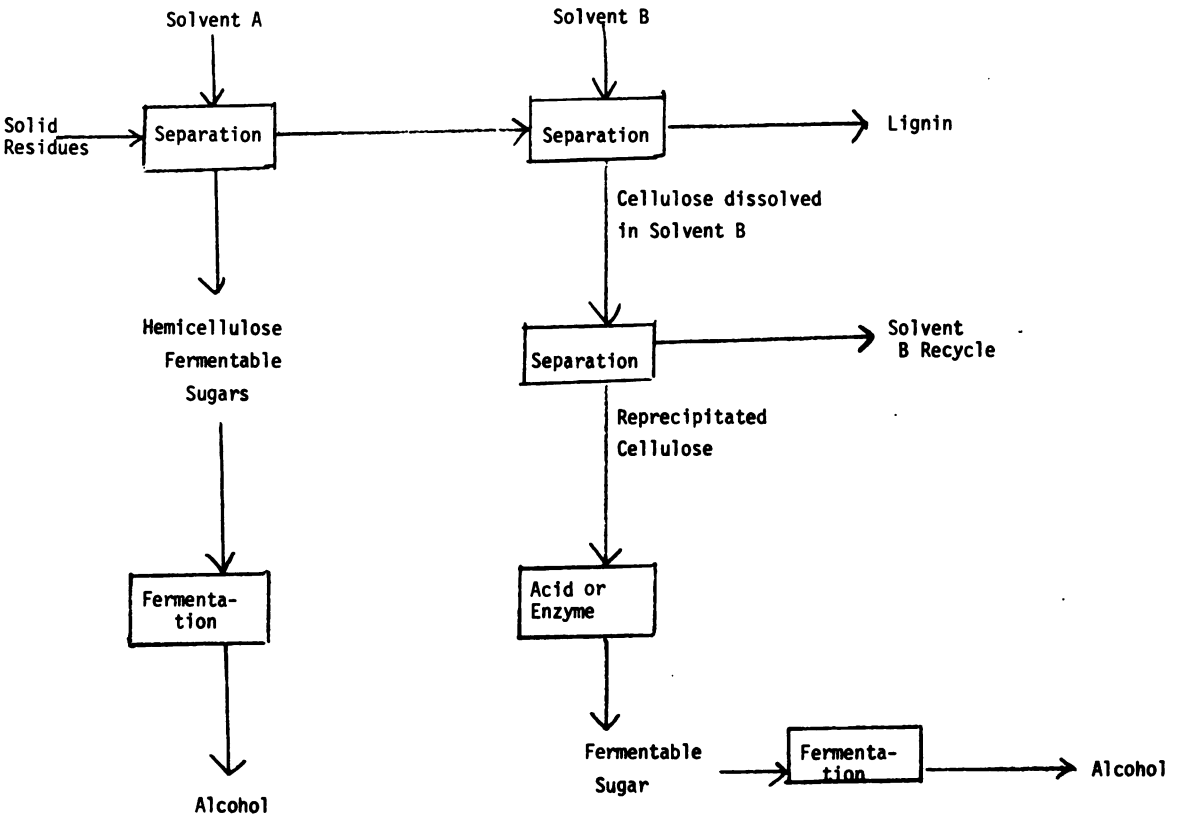

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DIAGRAM 7

POTENTIAL ALCOHOL CAPACITY

GRAIN ALCOHOL	7 BILLION GALLONS PER YEAR
CELLULOSE ALCOHOL	50 BILLION GALLONS PER YEAR
GASOLINE CONSUMPTION	120 BILLION GALLONS PER YEAR

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Mr. Fithian (acting chairman). Professor, the members have had to go to answer a rollcall vote, so will you please remain for questions?

We will go on with Mr. Rene Loser.

STATEMENT OF RENE' F. LOSER, CHIEF EXECUTIVE OFFICER, CHEMAPEC, INCORPORATED, WOODBURY, NEW YORK

I thank you for the invitation to testify before this distinguished committee. Ever since the introduction of our T.E.R. (which stands for Total Energy Recuperation) Process, based on patents by Dr. Hans Mueller, for the production of power alcohol, we have supported Congressman Bedell's Bill. We feel that it is a sound approach to the problems concerning not only the farming community, but the entire Country. Over the past several months, I have made a number of presentations to groups of farmers and businessmen ranging from 10 to 200 people. I was amazed at how well educated most of them already are on the production of alcohol , as well as the many problems involved in the different processes available on the market. They all also care very much about the environmental impact of such installations. Energy conservation is very important to them and quality of the attainable by-products is a big issue. Most important for the farmers above all, however, is their desire to grow as much as they possible can and to get a fair price for their products.

We have signed contracts for engineering and marketing studies for two groups in Iowa, one in Nebraska and two in Michigan with each calculation showing that we are able to economically produce alcohol and the various other products, enabling the farmers to get a very good price for their crops as well as an excellent return on investment. The terms of those contracts are that the

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plants will be engineered and constructed by Chemapec on a turn-key basis, if the financing is guaranteed. We have talked with financing institutions and met with private investors, who have approached us, regarding the financing of such alcohol plants. Even if the farmers put up the necessary raw materials, such as corn, as collateral, each money lender requires them to raise in addition several million dollars of so called "seed" money. If this can be arranged, there is no problem obtaining the additional financing, for a 20 million gallon per year plant, if our process is utilized with an attractive raw material.

It would make everything much easier, if the Government would assist the farmers financially by using the set-aside program money to finance alcohol plants and let them grow as much grain as they desire. This would create a whole new industry and would definitely benefit the economy of this Country.

It might be of interest to you to hear some figures on the various raw materials to produce power alcohol. The data is based on a 20 million gallon per year plant producing a 199.9 proof ethanol. Raw materials, chemicals, labor, enzymes, utilities, etc. have been computed at the present market prices. Income from the sale of by-products at the current market prices has been deducted. Interest on capital, depreciation, etc. which will be between 20 and 30 cents per gallon of alcohol produced must be added to the figures. No profit is included.

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RAW MATERIAL	MARKET PRICE	COST/GALLON OF ALCOHOL PRODUCED
Barley	$ 3.75/100 lbs.	$0.56
Corn	2.20/bushel	0.44
Rye	2.75/bushel	1.03
Sorghum	2.00/bushel	0.43
Wheat	2.96/bushel	0.96
Potatoes	1.20/100 lbs.	0.72
Sugar cane	22.00/metric ton	1.13
Sugar beets	29.00/metric ton	0.95
Molasses	60.00/metric ton	0.75
Triticale	88.00/metric ton	0.59

The key to the economics of the various raw materials is the utilization of the various by-products combined with an excellent energy balance in our process. As you will note, sorghum and corn are most attractive because we can produce a high-quality vegetable oil, as well as an edible meal which in the case of corn, has approximately 60% protein. I have a sample of such product with me and you are invited to taste it.

As you see, we do not destroy the food value of the grains as others do who end up with huge amounts of Distillers dried grain which could create a problem in the marketplace. Our product, which we call "Cornpro" can certainly be utilized as a

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food additive and will not create a marketing problem. There are also many foreign countries who would be glad to feed such a product to their starving populations.

Regarding other by-products such as CO_2, we already negotiated with firms who are willing to sign immediately contracts to take the CO_2 as it comes out of the fermentor and put a liquifying facility right next to the alcohol plant at their expense and purchase all the CO_2 that is available. Fodder yeast is another product of excellent quality with approximately 50% protein plus vitamin B complex. It can be sold at an attractive price for adding into soy mix and feeding to cattle.

Depending on the raw material, other by-products are produced and there is a market for all of them.

Should anyone object to alcohol as the main product, we could interpret the concept as such, that we call it a "Total Food Energy Processing Plant". Realizing that from one bushel of corn there are only certain factors and products that are food, and everything that is left after all the extraction of food has been taken from the bushel of corn is the by-product. Therefore, the alcohol to be mixed with gasoline is the by-product of such a "Total Food Energy Processing Plant".

Whatever interpretation is used, we are confident that we will break ground to build such plants in the very near future to the benefit of the farming community as well as the whole Country.

Thank you.

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Mr. ROSE. Thank you very much.

Are there questions for the panel?

Mr. Fithian.

Mr. FITHIAN. Mr. Chairman, I have a few quick questions. I was not sure, Dr. Tsao, about this. Let me have a brief explanation of the interchangeability of a plant to convert cellulose to ethanol as compared to one that could use grain.

Then I have another question on the relative productivity per ton. You went over that too fast for me to grasp at the time.

Mr. TSAO. I did have the information that you asked about, but let me explain it. The alcohol production process can be roughly divided into three steps. First, whatever the raw material has to be made into fermentable sugar. Once we have the sugar then we can use the second step to go through fermentation and produce alcohol. Then a third step is the distillation or recovery of the alcohol into the concentrated form. This would be suitable for fuel.

Mr. FITHIAN. I asked this of two witnesses yesterday. The same plant can be used for those?

Mr. TSAO. Yes, the same factory. The step two and step three are exactly the same. Step one for conversion of cellulose into sugar is more involved than converting grain corn into sugar. Therefore, if we have a factory already built based upon cellulosic material as the raw material, then we can easily somewhere in the middle of that step, put in grain corn and make sugar out of it. There is no extra equipment needed and no disruption due to the changeover from one raw material to the other.

Mr. FITHIAN. One last quick question. Did I understand you to say that your analysis of grain alcohol conversion ran somewhat slightly in excess of a dollar a gallon, or $1.10, or something like that a gallon?

Mr. TSAO. Yes, this is not only my analysis, but I heard this from the industry.

Mr. FITHIAN. How does that compare with cellulosic conversion as you projected it?

Mr. TSAO. We project that we can produce alcohol from cellulosic waste material at 85 cents per gallon.

Mr. FITHIAN. That is 85 cents versus about $1.10 to $1.40.

Mr. TSAO. That is right. The $1.40 is the current cost, but if we do the kind of research that we outlined to cut down the energy, particularly for the distillation, and also the reduced amount of energy needed to dry the so-called Distillers Dried Grain, then we can cut down the cost also. The $1.10 to $1.40 is roughly the range of the current production costs.

Mr. FITHIAN. Thank you very much.

Mr. ROSE. Mr. Bedell.

Mr. BEDELL. Thank you, Mr. Chairman.

Mr. Loser, your cost figures are significantly lower than what others have been talking about here for grain alcohol. Do you want to explain those figures? You have a figure of 44 cents. I assume that is not all of your cost.

Mr. LOSER. Dr. Tsao just made the proper remark. The key to the solution is that. He mentioned better energy in distillation. That is what we have achieved with vacuum distillation and we will now go into thermal distillation. We reduce that another kilogram of

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steam needed. Then, instead of drying the slop, we create methane gas which gives you a tremendous additional energy source.

In the case Dr. Tsao mentioned, he is evaporating it and we actually convert it into methane.

Mr. BEDELL. I take it that both of you agree that there is technology being developed which will both lower costs and which will significantly improve the energy consumption of a plant. Are you in agreement?

Mr. TSAO. Yes.

Mr. LOSER. Yes, we have it already.

Mr. TSAO. There are two major energy consuming steps. One is drying the distillers grain. The other one is the distillation. I have suggested in my testimony how to improve on both steps.

I talked about the distillation step. Insofar as the distilling of the grain is concerned, I agree with Mr. Loser that the best thing to do is to generate the methane gas rather than try to make some kind of a protein product out of it.

Mr. BEDELL. This is a critically important thing because those people who will try to say that alcohol fuel does not make sense tend to be talking about processes that we have had in the past. Both of you agree—and I have had any number of people agree with me—that the fact is that what we have done in the past is not necessarily what we can do today or in the future. We certainly should be aware of that.

In that regard, Dr. Tsao, you have done a lot of work in regard to the conversion of cellulose. How close are we to where we can actually convert cellulose into ethyl alcohol in an economical manner?

Mr. TSAO. We have put 4 years of intensive research in laboratory-scale research now. Right now we are at the stage of a pilot plant research. Our target date is September 1980 when we will start to design a full-scale factory. This is roughly the schedule. About a year or a year and a half from now we should be in the midst of designing a full-scale factory.

Mr. BEDELL. You would hope that somewhere about 1982 you would have factories in operation; right?

Mr. TSAO. Yes, in operation.

Mr. BEDELL. There is nothing holding you back in that regard like lack of money or anything?

Mr. TSAO. As of now there seems to be no serious problem. We are moving ahead.

Let me reemphasize again this. Insofar as the grain alcohol production is concerned the technology we have today is really not a technology for producing liquid fuel but rather a technology for producing whisky or drinking alcohol. We have not done the research. If we put in enough effort, I think we can definitely cut the costs.

Mr. BEDELL. I hope that message will come out loud and clear to everyone. I understand further that the cost figures you were quoting for grain alcohol ethanol plants come from what you have found from others.

Mr. TSAO. It is current technology.

Mr. BEDELL. Thank you very much.

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Mr. ROSE. We thank you both very much. We appreciate your being here.

Our next witness is Mr. Cloud L. Cray, Jr., president, Midwest Solvents Co., Inc., Atchison, Kans.

Mr. Cray, we wanted to have Mr. de la Garza introduce you but he is going to be detained, so we will have to ask you to go ahead, if you would.

STATEMENT OF CLOUD L. CRAY, JR., PRESIDENT, MIDWEST SOLVENTS CO., INC., ATCHINSON, KANS.; ACCOMPANIED BY EDWARD W. HUMMERS, JR., ATTORNEY AT LAW, FLETCHER, HEALD & HILDRETH, WASHINGTON, D.C.

Mr. CRAY. Thank you, Mr. Chairman.

I am Cloud L. Cray, Jr., president of Midwest Solvents Company, Inc., of Atchison, Kans., a producer of grain alcohol for 38 years.

I have here with me our Washington counsel, Mr. Ed Hummers from Hildreth in case he would want to make any comments as we go along.

Regarding our 38 years of experience, I would like to say that we are becoming tired of people using our many years of experience to indicate that we have an antiquated plant. I understand that has also come up in these hearings. We have spent approximately $1½ million per year over the past 10 years, or a total of $15 million, on new equipment and this does not include the $700,000 per year average, or several million dollars, in that same 10-year period in expense to maintain and upgrade our equipment in place.

This totals $22 million in 10 years. In other words, we have almost entirely rebuilt our plant in that time including the adding of carbon dioxide recovery, water treatment, and the newest energy-saving measures. I am not even going to pretend that we have all of them that are coming down the line in the next 10 years, but we have certainly put in the newest energy-saving measures.

We continuously have invited anyone, Congressmen included, to visit our plant and find out just how efficient we really are.

Believe me, in a business as competitive as ours when there were 136 distilleries that came out of the war and there are only two independent distilleries left, we would not be sitting in front of any of you today if we did not have the most efficient plant presently in operation in the United States.

As a preliminary matter, I would like to express the general position of my company with regard to gasohol. It has been widely quoted in the press that we are against gasohol and are, in fact, its greatest enemy. This simply is not true. We know that gasohol will work and we feel that it will be a good short-term extender for gasoline. As a producer, we have simply tried to be candid and honest about the serious economic and energy problems in the production and use of ethyl alchohol as a fuel.

The energy imbalance necessary to produce grain alcohol is a major public interest consideration. Only if the required heat is primarily derived from sources other than fossil fuels does gasohol presently make "energy sense." We want you, as legislators, to know the mountains that must still be climbed before this popular concept can be successful.

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We intend to produce gasohol and, in fact, are repiping one of our current stills to make anhydrous alcohol for gasohol at this very moment. Economically, this move is very good for us because alcohol for gasohol is currently selling at approximately $1.50 per gallon in contrast to the general sales price to traditional customers of approximately $1.25 per gallon. However, government subsidies are responsible for this artificial economic condition.

We have emphasized in previous testimony that alternatives to using alcohol as a fuel are in the long-term best interests of farmers and consumers and are just as exciting as gasohol, and that it is possible that alcohol is too valuable to burn as a fuel. As part of this brief summary, I would like to put into the record some reliable economic data that will show just how far we must go before alcohol will be economically competitive with other sources of energy as a fuel.

The cost of energy historically has been measured on a cost per million Btu. A large public utility on whose board I am privileged to serve is presently buying low-sulfur Wyoming coal delivered to their plant in mid-Kansas at a price of approximately 75 cents per million Btu's. They are buying spot coal purchases for approximately $1.50 per million Btu's.

The present cost of No. 6 grade fuel oil commonly used in powerplants can be purchased for $2.60 per million Btu's. No. 2 fuel oil which is the same as diesel oil is now selling for $4.38 per million Btu's. Gasoline, even after substantial increases is selling for $5.42 per million Btu's.

Significantly, anhydrous alcohol, at its present cost of $1.50 per gallon, is equivalent to $16.70 per million Btu's. And I might tell you here that there has just been another cost increase in the industry. It is presently selling for $1.60 and that is f.o.b. plant. I understand they are paying about $1.80 for it here in the East. That is equivalent to over $22 per million Btu's.

I think this comparison shows, perhaps better than any other way, just how far apart grain alcohol and fossil fuels, such as coal, are from a cost standpoint and that is today. Not in line with all of the research that you hear.

Perhaps with this comparison you can better understand why the petroleum companies feel that our next significant source of liquid fuel will be from direct conversion of coal and/or shale rather than from an agricultural product. I do not intend to repeat my previous testimony which is listed here and is a matter of public record. This includes my testimony at the following hearings: On December 12, 1977, I testified before the Subcommittee on Agricultural Research and General Legislation of the Committee on Agriculture, Nutrition and Forestry of the U.S. Senate in Indianapolis, Ind.; On July 11 through July 13, I testified at the hearing before the Subcommittee on Advanced Energy Technologies and Energy Conservation Research, Development and Demonstration of the Committee on Science and Technology in the U.S. House of Representatives, Washington D.C.; On November 30, 1978, I testified at the hearing before the U.S. Department of Energy on Alcohol Fuels—Economics, Supply Production, and End Use—in Chicago, Ill.

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I do intend to confine most of my comments today to H.R. 3905, which I understand is the primary topic of this discussion.

Midwest Solvents Co. is seriously concerned about the effects of H.R. 3905 for the following four reasons:

First, we are deeply concerned with the bill's total emphasis on the use of the ethanol produced for fuel purposes only. We think that it is absolutely essential in our country that continuous research and incentive be directed to alternative uses of ethyl alcohol. We think these alternatives are even more exciting than gasohol, and that is mighty exciting today, believe me, and therefore we will spend more time on these alternatives than in previous testimony because they are specifically excluded by this bill, whereas they have not been in former legislation.

Let me give you the same kind of cost comparison regarding fermentation ethanol versus synthetic ethanol prices as I did in the energy examples above. When we started selling grain alcohol after World War II, we were the lowest cost producer in the entire country. We were able to sell grain alcohol competitively at approximately 57 cents per gallon f.o.b. plant. At that time, synthetic ethanol from petroleum sources was selling at a price of 28 cents per gallon delivered in tank-car quantities.

By the late 1950's and early 1960's, our price of grain alcohol with increased grain and energy costs had increased to 65 cents per gallon f.o.b. plant while the synthetic alcohol had increased to 48 cents per gallon delivered in tank-car quantities.

At the present time, our price for grain alcohol with increased grain and energy costs has increased to $1.25 per gallon f.o.b. plant while the synthetic alcohol price is $1.25 per gallon delivered in tank-car quantities.

You can see that the synthetic alcohol price has increased from less than half the price of grain alcohol to a point where it is almost equivalent, with the exception of freight cars.

We think these figures show clearer than anything else just how close fermentation alcohol is to replacing synthetic alcohol from petroleum feedstocks, now and in the future. This price relationship exists without government subsidy and is the result of relatively natural economic forces.

At this time we would like to place in the record, if we could, Mr. Chairman, a paper entitled "Ethanol, an Alternative to Its Use as a Fuel" presented before the Workshop on Fermentation Alcohol in Developing Countries, on March 26-30, 1979, in Vienna, Austria, by Mr. Paul J. Johnston of Union Carbide Corp.

Mr. ROSE. Certainly, that will be fine.

[The paper referred to above is held in the subcommittee's file.]

Mr. CRAY. Obviously, Mr. Johnston did not give this talk to improve my testimony here today because Union Carbide is the largest single producer of synthetic alcohol from petroleum feedstocks and has been a great competitor of ours down through the years for this use.

Though Mr. Johnston's comments were made especially for developing countries, we frankly believe that they have some important consideration for this discussion today. His paper points to the fact that, in the past, over 70 organic chemicals were derived from

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ethanol, one of the original building blocks of the chemical process industry in the United States.

He suggests that developing fermentation alcohol for this purpose in the future is indeed a sensible alternative and concludes his summary with the following:

> It is an alternative with a future because no matter what development renders the internal combustion engine obsolete, the chemicals that can be derived from ethanol will probably always be important to our economies.

It has been reliably reported to us, and I mean by the synthetic industry, that there perhaps will never be another synthetic alcohol plant constructed in the United States. This is because of the rapidly increasing costs and depleting supplies of natural gas from ethylene, the feedstock of these synthetic alcohol plants, has previously been made.

Work has recently been started on a huge new plant making these chemical feedstocks synthetically in Saudi Arabia, undoubtedly with the idea to export them to the United States. The balance of payments problem is obvious.

However, in addition this will mean that in the future, our country will not only be dependent upon the Mideast for its source of oil, which we can get in many localities in the world, but even more seriously we will also be dependent on this sensitive part of the world for our total feedstocks for our petrochemical industry. These plants are very capital intensive and cannot be constructed overnight. This dependence could be catastrophic to our economy in the future.

Seven to nine percent of the total petroleum used in our country today is used for chemical production. If just the organic chemicals produced prior to 1960 from industrial ethanol but presently synthetically produced from petroleum products were produced today from fermentation alcohol, then the current annual requirement would be in excess of 950,000,000 gallons of fermentation alcohol in this country. This amount of alcohol would require 50 new 20-million gallon fermentation alcohol plants—roughly the size of our plant.

I hope you find this as exciting as we do. It certainly shows that, as we have been accused of in the past, we are not against competition because under no circumstances could we afford to build 50 plants the size of ours. We think that very little subsidy, perhaps in the range of 15 to 20 cents per gallon, could reestablish the production of industrial ethanol from agricultural products.

This contrasts vividly with the $1 to $1.25 per gallon subsidy that is required to make alcohol for gasohol economically attractive. In our opinion, the decision to furnish incentives for these alternatives to fuel would mean immediate use of large quantities of agricultural products for a long-term economically sound and useful purpose.

Unfortunately, if H.R. 3905 is passed in its present form, we estimate that, even though industrial alcohol is presently in short supply, there will be no movement creatively in the direction of producing fermentation alcohol for industrial uses because all current fermentation plants would be practically forced economically to move immediately into gasohol.

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Obviously, if corn could be purchased at 80 percent of its established price and current tax subsidies continue for gasohol, companies such as ours are economically justified in taking the short-term substantial dollar benefit rather than develop the new exciting future possibility for industrial alcohol.

In fact, as has been stated in this testimony, one new grain alcohol plant, namely, ADM in Decatur, Ill., has already made just that decision.

With regard to the desired new alcohol fuel production facilities——

Mr. ROSE. Mr. Cray, they made what decision?

Mr. CRAY. To go from industrial alcohol production totally into gasohol because of the economic advantage.

Mr. ROSE. Your basic point is that that would be the wrong way?

Mr. CRAY. There would be no incentive for fermentation alcohol plants to move toward replacing the synthetic industrial alcohol but they would be practically forced to go directly into fuel alcohol or gasohol by this legislation because that is the only thing that this legislation applies to. You cannot produce other hydrocarbons, just gasohol. So, what I am saying is that you would remove the incentive.

With regard to the desired new alcohol fuel production facilities, we believe that their long-term survival will be dependent upon the continuation of an artificial economy supported by substantial Government subsidies. We do not believe that such a case is to the long-term benefit of the American farmer or the energy consuming public.

Our second major concern with this bill is the emphasis on corn rather than a continued creative search for other wastes of agricultural materials that we think will be the fermentation feedstock of the future. How could there be any incentive to look for other materials such as damaged grain, fruit, and vegetables, sugar beet wastes, cane wastes, and eventually the one that you have heard about today, the conversion of fiber by new technical processes to sugar?

Incentive is reduced or eliminated when corn or other grains could be purchased at artificially low prices. Far greater long run benefits will accrue to the farmer if he has a ready market for these damaged crops and/or new agricultural commodities like fiber.

Mr. ROSE. Excuse me. How long do you think we should wait for that?

Mr. CRAY. I think it is developing as you have heard in your testimony, Mr. Chairman. I think it is developing through the private sector.

Mr. ROSE. If the price of gasoline got to $2 or $3 a gallon in this country, then there would be no incentive for anybody to replace any old wornout World War II technology with anything newer to produce alcohol for gasohol, would there?

Mr. CRAY. As I said previously, we are not opposed to the gasohol concept. We are opposed when the gasohol concept replaces all other incentive for private industry to go into what we consider better alternative uses of this ethanol and much more economical uses.

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In other words, it could be far better short term to move with 50 plants into this grain alcohol which can still be used for fuel at any time in the future that it is economically viable. It would be very fine. But it is much better, in our opinion, to move first toward the petrochemical feedstock industry. You are developing exactly the same. Nothing that you have heard here about lowering the cost of alcohol is adverse to what we are suggesting. We are just saying that the sensible alternative to fuel is to move into these alternative uses which have advantages far and above the present use of just burning the ethanol for its Btu content. These petrochemicals are really worth something in the petrochemical industry. We are going to go right on replacing these from petrochemical feedstocks.

Mr. ROSE. Let me see if I understand that.

You are saying that we should not divert so much alcohol into the gasohol stream because we are missing, what you say is, the more economically feasible and the greater opportunity of pushing alcohol into a substitution for petrochemicals. Is that right?

Mr. CRAY. Exactly. Seven to nine percent of all the petroleum use in our country, which is a great deal more than 10 percent of all the gasoline, is being used to produce petrochemical feedstocks. These are chemicals synthetically from petroleum.

Mr. ROSE. Why can't we do both?

Mr. CRAY. You cannot do both—excuse me. We don't think you can do both if you set up legislation. This is the problem. No. 1, if you set up legislation that requires any of this aid of loan guarantees or lower grain prices, then that must go into fuel rather than being able to go into other hydrocarbon production.

Mr. ROSE. Mr. Bedell will take the chair while I go vote.

Mr. CRAY. Our second major concern with this bill is the emphasis on corn rather than on the continued creative search for other wastes of agriculture materials that we think will be the fermentation feedstock of the future.

How can there be any incentive to look for other materials such as damaged grain, fruit and vegetables, sugar beet wastes, cane wastes and eventually the conversion of fiber, that you heard about today, to sugar.

Incentive is reduced or eliminated when corn or other grains can be purchased at an artificially low price. Far greater long-run benefits will accrue to the farmer if he already has a ready market for damaged crops and/or new agricultural commodities like fiber.

If your interest is in making gasohol as economically as is possible, we believe it would be better to provide a direct subsidy to gasohol rather than to individual commodities in order to facilitate the selection by alcohol fuel producers of the lowest priced raw material. Innovative technology and feedstock selection are more likely to produce economically sound and energy-efficient alcohol production facilities.

Section 1420 of the Agriculture Act of 1977 is an example of the flexibility that is desirable. The proposal of Midwest Solvents to build an alcohol plant co-located with an existing sugar mill in the Rio Grande Valley of Texas is one of the four pilot projects authorized by USDA under that legislation. The Midwest Solvents proposal will utilize the heat, electricity, and molasses generated from the sugar mill and sweet sorghum in the production of alcohol. Signifi-

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cantly, the primary heat will be derived from burning sugarcane bagasse rather than fossil fuel.

I would like to add that this pilot project will cost an estimated $24 million. Hence, we will obviously be investing $9 million of private capital above the Federal loan guarantee. The plant will be constructed to use produce fuel and industrial grade alcohol in the most efficient manner.

In cooperation with USDA and the Texas A. & M. research facility at Westlaco, we will utilize in commercial application sweet sorghum as a new feedstock for alcohol production.

The use of sweet sorghum will have universal application because it can be grown throughout the continental United States.

Gentlemen, can you believe that we have been severely criticized by some gasohol proponents because we have designed this plant to use the waste energy and agricultural products of this economically depressed part of our country along with 80-percent grain, namely milo, to produce gasohol? We thought innovation was exactly what the gasohol proponents have been working for all these years and they apparently would rather we had been turned down in favor of what are mostly energy inefficient conventional all-grain plants that would require continuous extensive subsidies to survive.

Our third concern is that this bill would place the U.S. Government in the feed-ingredient business. We believe this to be unnecessary and unwise. The Department of Agriculture would find that the byproduct feeds in the alcohol process are extremely difficult to store because they tend to pick up water and become a problem from both heating and hardening over long periods of time in storage.

Also, this would be one more Government control in a market never seriously affected before by control at a time when most legislators are attempting to make our free enterprise system work better.

Our final concern with H.R. 3905 is the complex and highly confused financial picture coming out of its proposed method of operation. For example, the bill proposes guarantees for loans having a term of up to 20 years. That is a reasonable time frame for the sizable capital expenditures required for an alcohol plant.

However, proposed feedstock supply contracts are limited to 5 years, feedstock prices are pegged at artificial levels, and byproduct feeds are proposed to be placed in a controlled economic environment in which the Secretary of Agriculture is charged with the obligation of assuring the orderly marketing of agriculture commodities used in the production of protein supplements.

Interposed upon that setting is the present exemption of gasohol from the 4 cents per gallon Federal excise tax which is scheduled to expire on October 1, 1984 and the variety of State tax exemptions of differing expiration dates.

Under such an environment, it would be virtually impossible for an alcohol plant operator to know his true costs and marketing conditions.

The feasibility study required to obtain long-term credit from a financial institution would be more guess and fiction than projection and fact. We have had a little bit of experience in that in setting up our projections for our Texas plant.

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Mr. BEDELL. That is from the Department of Agriculture.

Mr. FITHIAN. If I may say this, Mr. Chairman, I think it is pretty well documented in lots and lots of very carefully run tests. We are talking about two to three points, the USDA not to the contrary and notwithstanding. This has been run at the University of Nebraska years before this controversy even started, so I think we ought to start with what is already known. I don't see any reason to spend a nickel of Federal funds to go out and reestablish facts that we already have.

Mr. CRAY. At that point let me interject because people feel we have been so negative on this. This was exactly the type of testing we recommended the State of Nebraska do in 1968. That is testing to see what the octane improvement ratio was for alcohol in a gasoline mixture.

Mr. FITHIAN. I have had some personal experience so let me relate this to the committee and then I will shut up, Mr. Chairman.

During the last campaign we leased a Chevrolet Impala for a campaign vehicle which was a new one. It pinged every single day that we drove it except the day that we started commercial sale of gasohol in Indiana. I happened to have had the privilege of pumping the first gallons.

We then filled the car with it and for that day and part of the next morning when that tank was being used up that was the only time in the 40 days and several thousands of miles. I don't know if it's 10, or 2, or 1, but I am telling you from a layman's standpoint that I know what the car did with both kinds of fuel in it.

Mr. CRAY. It is obvious to me. I feel badly in this kind of position. All of the comment is designed to make me say that we are against gasohol. This is not true. I think gasohol is excellent. I have stated that.

Mr. FITHIAN. I welcome your support for the idea, but I am questioning some of the facts or bases that you have presented because it is in such sharp contrast to what we already have from a number of sources. It is like the Army where there is no one person out of step. You can make a choice whether you are out of step or whether everybody else is.

Mr. CRAY. I remember a discussion with Representative Bedell on a trip that we took in 1969, and I was very much impressed then before he was a Representative of his feeling about social consciousness and the fact that a businessman should tell things the way they see them in front of government. I have taken that idea all through my life. No one can consider, I think, that I am making these statements to help my own company out because my best financial purpose would be to suggest that gasohol is the greatest thing that ever happened and that all of that money would do nothing but make a very financial picture for my company.

Believe me, when we have been making these statements we have been making them in an attempt to show the current state-of-the-art. I assure you that I am sure that technical progress will occur. It is a product that has been produced for 5,000 years. I perhaps might not be quite as optimistic as some of the people that

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Mr. CRAY. Sir, I don't believe there is anyone against that idea. In other words, I think that is one way to produce a liquid fuel. I am saying that the present state-of-the-art would indicate, as our friend from Virginia said, that it would be much better to take that 75-cent-per-million-Btu coal and convert it directly to a liquid fuel at some loss of efficiency but certainly the figures I have heard is that the conversion would be in the vicinity of 65 or 70 cents per gallon, or something like that if it were done right at the coal site.

My point is that there is nothing wrong with it. Believe me. There is nothing wrong with converting grain or agricultural products to alcohol and mixing it with gasoline to produce gasohol. There is nothing wrong with this.

The only thing that you must look at very carefully is how energy intensive it is because it does not make an awful lot of sense to give up a renewable resource and then give up almost as much of the nonrenewable resource as you are getting to come out with. Nor is it, in my opinion, very good for our country to put perhaps three to four times the cost economically into that fuel as you have other fuels available at that time.

I think that there will come a time—and none of us know when, and it could be 50 or 100 years from now—when biomass alcohol will come into fruition. I am in favor of using the petrochemical replacement method to move rapidly toward this so that we will have in 50 or 75 years developed this technology and then we will be able to make a total fuel from alcohol that is required for the internal combustion engine.

Mr. BEDELL. Mr. Fithian talked about being out of step. It is difficult for me to believe that if you had a 2-to-1 loss ratio—and I know of nobody that says that, not even you—and if you took 2 Btu's of 75-cent coal to produce gasoline which sells at several times that amount, then I cannot understand why somebody is making such an issue when we have a big supply of coal and we can use our grain to convert that coal into the liquid fuel. We are short on time but I have to tell you that that is an argument that I simply cannot understand.

Mr. ROSE. While you are thinking that question through, let me say this, Mr. Cray.

Congressman Findley asked permission to introduce a constituent and friend of his who will testify a little later. Then we will not hear that testimony at this time, but we welcome our colleague, Mr. Paul Findley, for the purposes of introduction.

Mr. FINDLEY. Thank you very much. I will be back here when my constituent testifies, but I welcome this opportunity. Al Mavis lives in a community near Springfield, Ill. It must have been 7 or 8 years ago that Al Mavis started talking to me about gasohol. He did not really get my attention then. I wish I had been smart enough to have listened carefully, but he is without any question in my mind the original exponent of gasohol in the State of Illinois if not in the entire Nation.

The Nation is now listening to him. He has been on the "MacNeil/Lehrer Report." He has been on network television a number of times in recent months in behalf of gasohol. He has a position with the State of Illinois which gives him an excellent opportunity

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to carry the message about this remarkable new development that is now coming to public attention.

He is without question the most knowledgeable person of my experience in regard to gasohol. I think the committee is very fortunate that he has been able to spare enough time to share his knowledge with us. I look forward to his testimony a little later today.

Mr. BEDELL. We are short on time and we could debate this, but let me tell you this. You have testified that you think it takes 139,000 Btu's to make 90,000 Btu's of alcohol. I do not think we need to debate this point, but let me tell you this. Most of my people think that if we are going to take 139,000 Btu's of 75-cent coal to produce liquid fuel which we can burn in automobiles that that would be a good thing to do.

Mr. CRAY. Basically, our only difference is the fact that we think that it could be more economical to go toward replacing the petrochemical feedstock industry than it would be to burn the alcohol when you get done because we think you would be coming out with something of more economic and useful value to the people of the United States. As I pointed out in my testimony, that is still a very, very tremendous number of plants that would be required.

Mr. BEDELL. Let me mention one thing. You have testified that you are really not opposed to alcohol fuel production, and then you said "I do not intend to repeat my previous testimony, and I still feel it is valid and it is a matter of public record."

In that testimony you stated, and I quote from what information I have, "We still feel that gasohol simply does not have a prayer of long-term success until all fossil fuels in this country and around the world are practically depleted. The spreads between alcohol and normal fossil fuels are simply too great both from energy usage and cost basis." Do you still feel that way, Mr. Cray?

Mr. CRAY. I think the testimony I gave today in a little different way hopefully will say the same thing when you compare the cost for a million Btu's, yes.

Mr. BEDELL. Nobody questions your motivation. But I have to tell you that I have a terrible time feeling that somebody could say that they support gasohol and support alcohol and then make that sort of a statement and believe that statement is correct.

Further than that, I certainly have no criticism of you for trying to get the loan that you got from the Department of Agriculture. I know of nobody that would condemn you for it. I think that the Department of Agriculture was very, very wrong in making that loan. That is where our difference comes from. I hope that you would understand that I have no criticism of your applying for the loan.

Mr. CRAY. Let me tell you one thing I would like to be able to prove in the future. I may not be here again to testify.

If anybody in this country can made gasohol work, then we can. I think that is why we were given the project because we have the best application. I think we had the best application in energy balance. I think we had the best application from an economic balance. It would pay for itself over time. I think we can go out and get a loan on that basis. I think we can run that plant.

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Other people may do that also, but really, we are in favor of trying. Really, we are.

Mr. BEDELL. Thank you very much.

Mr. Sebelius.

Mr. SEBELIUS. I have known Mr. Cray for many, many years. He followed me as president of the Kansas Day Society. We have that bond. I have great respect for his knowledge and his successful operation in making alcohol.

When you said you were disappointed that he got that loan, that is the only one he used to experiment with grain. That is an 80 percent milo, and I am certainly not disappointed to know that we are going to have one, at least, that is going to be using grain and going to go forward with the technology.

I appreciate and welcome you here, Mr. Cray. I am sorry I could not have been here. We were debating the Alaska bill on the floor. Now we are talking about alcohol.

Mr. CRAY. It is nice to see you, Mr. Sebelius.

Mr. ROSE. Is anybody here from the U.S. Department of Agriculture? If so, please come up here.

Mr. Brown, you told me before you left yesterday that you were going to be back here today to tell us about the energy projects and grants, that is, the pilot programs that have been run through your department.

Is that not correct? Did you not tell me that?

Mr. BROWN. Yes. I can discuss those with you.

Mr. ROSE. Please do.

STATEMENT OF HARRY BROWN, OFFICE OF ENERGY, U.S. DEPARTMENT OF AGRICULTURE

Mr. BROWN. Under section 1420 of the Food and Agriculture Act of 1977 we have tentatively approved loan guarantees for four pilot projects.

Mr. ROSE. Was Midwest Solvents one of these?

Mr. BROWN. Yes. The other three are Enerco, Inc., which would produce low Btu gas along with heating oil and charcoal from forest residues using a number of mobile converting units. This project is in Pennsylvania but will involve a number of mobile units that will be at different locations.

The second one is also of a hydrocarbon nature. It is Guarantee Fuels which produces fuel pellets for direct combustion in industrial boilers based on agricultural and forest residues. This would involve two plants in North Carolina.

Those are the two hydrocarbon projects.

The two alcohol projects are Midwest Solvents, which we have heard about, and Biomass/Suchem Corporations. The latter are subsidiaries of Savannah Foods and U.S. Sugar and a plant in Clewiston, Fla. which would use sugar cane residues for conversion to ethanol. This project involves the Tsao process which you have been hearing about for the cellulosic conversion.

There would be a portion of this project which would be devoted to engineering and pilot work at Purdue University before going full-scale in production on that project.

Mr. ROSE. Thank you very much, Mr. Brown. Mr. Bedell.

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Mr. BEDELL. Mr. Brown, did you check the record with regard to the passage of that amendment in the committee?

Mr. BROWN. Yes, sir. We looked into that.

Mr. BEDELL. Then you are aware of the fact that Mr. Thone who offered the amendment said that this might be called the gasohol amendment for short? Are you aware of that?

Mr. BROWN. Yes.

Mr. BEDELL. Of the projects that USDA approved, two were not for alcohol and two were for industrial alcohol and none were for gasohol; is that correct?

Mr. BROWN. Two were for alcohol and two were for industrial hydrocarbons.

Mr. BEDELL. That is not my question. Were any of those for alcohol fuel for gasohol?

Mr. BROWN. Yes. The Florida one will produce alcohol.

Mr. BEDELL. Was it for alcohol fuel for gasohol?

Mr. BROWN. It will have the capability for both alcohol fuel——

Mr. BEDELL. That is not my question. I don't want to be difficult, but was the loan made for alcohol fuel for gasohol?

Mr. BROWN. Yes.

Mr. BEDELL. Thank you.

Mr. CRAY. May I break in here for a moment regarding my project?

The loan application was approved on the basis of an economic feasibility study. Our economic feasibility study to make it economically viable was based on the industrial alcohol price which we thought was something we could put our finger on.

The only reason it was not based on gasohol was that we did not think it was anything positive enough to reflect a future pricing basis and therefore we had a positive economic balance based on industrial alcohol but our thought was this. Our first plant down there will not even be designed to produce industrial alcohol. It will be produced as a gasohol plant.

Mr. BEDELL. Was the application for gasohol or was the application for industrial alcohol because of the economics of industrial alcohol?

Mr. CRAY. I would turn that over to Mr. Brown. I was not there when they approved it.

Mr. BEDELL. But you just testified that your application was for industrial alcohol because it was more economical to produce.

Mr. CRAY. We did make an economic study based on the fact of the pricing that we thought was stable enough to talk about and that happened to be industrial alcohol. We had no stable basis for gasohol.

Mr. BEDELL. I will not argue the technicality at this time. I am trying to point out that the ones that were approved were for industrial alcohol. That was what the applications were for. That was what was approved by the Department of Agriculture. At least it was the understanding of many of us on the committee that the purpose of the loan program was to encourage gasohol production. That was the wording of the amendment's author.

Let me proceed further. We are short on time.

Mr. HUMMERS. May we read a statement from the application that we filed with the Department of Agriculture?

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Mr. BEDELL. Yes, go right ahead.

Mr. HUMMERS. It is one of the by-product sections of the application and it reads "The fuel grade product would be suitable as an industrial fuel or for blending with gasoline." It clearly is the intent and the wording of this proposal that the alcohol produced would be sold in the fuel market if it was possible.

Mr. ROSE. Let me regain the time, if I can.

Mr. Brown, the only thing I was concerned about is this. Both Mr. Williams, the Deputy Secretary and yourself, told me yesterday—and you in private, and Mr. Williams, the Deputy Secretary, before the audience—that you would be here today to follow these hearings which we think are very important. We have spent a nice portion of our time this week in conducting these hearings, and we were disturbed that you were not here this morning, or that the Deputy Secretary did not have somebody here.

I wish you would tell him that in the future if they can't be here, don't tell us they are going to come. Otherwise, we are going to start swearing Department witnesses before they testify.

We thank you all, and you are excused.

We call now Mr. Harry B. Lyon, American Society of Petroleum Operations Engineers, Alexandria, Va.

Mr. Lyon, please proceed.

STATEMENT OF HARRY B. LYON, AMERICAN SOCIETY OF PETROLEUM OPERATIONS ENGINEERS, ALEXANDRIA, VA.

Mr. LYON. Thank you, Mr. Chairman.

I was asked to testify by Mr. Richard Merrick.

I am a registered petroleum operations engineer and a member of the American Society of Petroleum Operations Engineers. As chairman of the Education Examination Committee, I was asked to provide a paper on the storage and handling and the blending of gasohol. That paper you have now had in your possession for the past week.

As members of the committees you have by now read the paper which was published by the society January 10 of this year.

In the interest of time, I will not read you the original paper. However, I will read you additional information that the society has developed since January. I have copies with me of the revised paper which I believe you already have.

The members of our society feel that the information correlated to date is not the final word on gasohol and its problems of storage, handling, and blending. We will continue to monitor gasohol by reviewing, updating, and correlating information we obtain in the field.

The continuing use of gasohol in ever-increasing quantities over an extended period of time is giving us the time and experience to revise some of our original statements in my paper.

Since this is the first time the American Society of Petroleum Operations Engineers has been invited to testify before a congressional committee, I feel it is incumbent on me to give you a very brief explanation of our function.

Our membership is composed of those engineers who are charged with the responsibility of design, specification, construction, supervision, and maintenance supervision of petroleum marketing instal-

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lations. To be specific, we work downstream from refineries. Membership in the society is by examination only.

The effects of gasohol on seals, gaskets, etcetera, are these. Gasohol does have an adverse effect on buna N seals. The alcohol will remove the plasticizers from the buna N. This removal will cause the buna N to shrink and harden somewhat with a corresponding loss of memory. This is especially critical in loader swing joints, curb hose swivels, some automatic nozzles, meters, and transport hose couplings. It is recommended that all buna N seals be replaced in these items with a fluroelastomer type compound seal by the propriatory name of Viton before this equipment is put on stream in gasohol or stock alcohol service.

There are hazards with gasohol. The potential fire-safety hazard of gasohol is tremendous. The storage of alcohol stocks and gasohol in above-ground tanks that share a common dike with other petroleum products courts disaster. The problem arises because the common fire-fighting foams used for fire suppression of petroleum products are not compatible with gasohol and stock motor-grade alcohol.

A 90/10 gasohol blend will take on the characteristics of a straight alcohol fire. Standard foams stocked by rural and most metropolitan fire departments will not extinguish alcohol composed fires.

A member of the National Fire Protection Association Committee 11B, which is the National Fire Code Committee on high expansion foams has informed me that the only type of foam that he knows will extinguish a petroleum-alcohol or straight alcohol fire are Aero Water PSC manufactured by National Foam and Light Water ATC manufactured by 3M. These two foams are considerably more expensive than standard fire-fighting foams for petroleum products. This means there is little likelihood of any rural fire companies and the majority of municipal fire departments having these foams available.

With this fact in mind the American Society of Petroleum Operations Engineers has been in touch with members of the National Fire Portection Association Code 30 Committee to request that they take this information under advisement with the hope that such a review will result in the revising of code 30 to cover this hazard.

Under ordinary circumstances and using standard safety precautions, normal physical contact with gasohol and stock alcohol will not be injurious to personnel. However, upon consultation with two physicians, one of whom specializes in the treatment of alcoholics, I have obtained several facts that are permanent. There is a growing body of information that motor grade alcohol can be injurious to physical health of some of those who work in the storage, handling, and blending of it, contrary to information in my first report that you have.

Alcohol can be induced into the body three ways: by absorption through the skin, by ingestation, and by inhalation of the vapors.

With respect to the effects of motor-grade blending alcohols stocks on the skin and the inhalation of vapors, extreme care must be taken to avoid such exposure as possible. It is absolutely essential that all personnel who are taking Antabuse, a drug used in the treatment of alcoholism, and/or Librium or Valium, which are

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tranquilizers, not come in contact with the alcohol because such exposure will cause adverse and possibly quite severe reaction in them. It is advisable that all personnel check with their personal physicians before being assigned to handle and/or blend this product. There are prescription and patent medications on the market which might give adverse reactions or side effects that only the physician could predict.

I am going to skip the rest of this section down here because I believe you gentlemen will pick it up in the paper, in the interest of time. But I wanted to get these two points across to you that the society felt was necessary on the safety hazards of this product.

Mr. ROSE. Thank you, Mr. Lyon. Do we have questions? Mr. Bedell.

Mr. BEDELL. I want to clarify something. Mr. Lyon, are you with the American Society of Petroleum Operating Engineers?

Mr. LYON. Operations engineers. I am chairman of the Education Examination Committee.

Mr. ROSE. If there are no further questions, we thank you very much.

[The prepared statement of Mr. Lyon follows:]

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AMERICAN SOCIETY OF PETROLEUM OPERATIONS ENGINEERS

P. O. BOX 956

RICHMOND, VIRGINIA 23207

January 10th, 1979 - Revised

Testimony of the American Society of Petroleum Operations Engineers on HR-3905

Joint public hearing of the House of Representatives Agricultural Sub-Committees of: Conservation, Credit, Grain, Livestock, and Oversight

May 16th, 1979 2p.m. Hearing Room #1302 Longworth Building, Washington, D.C.

GASOHOL: Problems and Suggested Solutions for the Handling and the Storage of Gasohol in the Washington, D.C. Metropolitan Area

This report is compiled to inform the members of the American Society of Petroleum Operations Engineers of some general information on gasohol, some of the problems its development and its use are and will be creating for operations engineers, and some suggested solutions to these storage and handling problems. This report is neither a recommendation for nor an opposition to the use of gasohol. It is an attempt to apprise the members of the facts and the figures as they have been developed in researching out a new product blend which is or shortly will be in use. Thus, operations engineers must be aware of all of the information set forth below if gasohol is to be stored and handled safely and efficiently. This report is predicated on a contrast between no-lead gasoline and gasohol. Leaded gasoline is not taken into consideration.

Definitions

Gasohol: is a blend or mixture of motor-grade gasoline, hereinafter referred to as gasoline, and denatured ethanol alcohol manufactured from grain, hereinafter referred to as alcohol.

There are two types of motor-grade alcohol manufactured at this time: 1. 192 proof 2. 200 proof. The make-up of motor-grade alcohol is: 100 parts ethanol + 5 parts methanol + 10 parts anhydrous isopropyl alcohols.

Common blends are: 90% gasoline and 10% alcohol, hereinafter referred to as 90/10; 88% gasoline and 12% alcohol, hereinafter referred to as 88/12; and 85% gasoline and 15% alcohol, hereinafter referred to as 85/15/

Because of excessive freight costs from the mid-West to Washington, D.C. Metropolitan Area, 90/10 is the most economical blend to market at this time.

Excerpts From a Laboratory Analysis Report
November 29th, 1978

Two products were analyzed. Sample "A" consisted of Citgo No-Lead 87 octane rating - 2 U.S. gallons. Sample "B" consisted of Citgo No-Lead 87 octane rating plus 10 % 200 proof alcohol - 2 U.S. gallons.

	Sample A	Sample B
Ried Vapor Pressure	11.4	12.3
Undissolved water & suspended matter	None	None
Lead grams per U.S. gallon	0.029	0.027

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Octane number	87.1	89.5

Methods of Blending

At service station tanks: This is the least desirable approach to blending. This method is placed in this report strictly for information, for it has not been done in the Washington, D.C. Metropolitan Area.

Fill the tank one-third full with gasoline, add 10% alcohol, complete filling of the tank with gasoline. Measurements for this fill are by gallonage. Sufficient time must be allowed for the alcohol and the gasoline to achieve a uniform temperature before it is dispensed. This is done only when the service station personnel is blending the station's gasohol from 55-gallon drums of alcohol.

This information was taken from the gasohol report of the Iowa Development Commission. This is a very poor method of blending, and it is not a recommended practice. The hazards of storing drums of 200 proof alcohol in service stations is self-evident.

At jobber top-loading rack: Loading arms must be equipped with drop pipes and flow deflectors. Fill the tank truck compartment 10% of the compartment's volume with alcohol. Complete filling of the compartment with gasoline. Due to the slow loading rate at jobbers' racks, it is recommended that the alcohol and the gasoline be at approximately the same temperature.

At bottom-load terminals: Fill the transport compartment 10% of the compartment's volume with alcohol. Bottom-load to the compartment's capacity with gasoline. The differences in the products' temperatures is not as critical here as in tank wagon top-loading.

It would not be economical to install proportioning pumps/meters or other types of blending equipment downstream fromthe loader-meters at the jobbers' racks for less than 25,000 gallon through-put per eight-hour day.

Effects of Gasohol on Seals, Gaskets, et al

Gasohol does have an adverse effect on buna N seals. The alcohol will remove the plasticizers from the buna N. This removal will cause the buna N to shrink and harden somewhat with a corresponding loss of memory. This is especially critical in loader swing joints, curb hose swivels, some automatic nozzles, and transport hose couplings. It is recommended that all buna N seals be replaced in these items with a fluroelastomer type compound seal (propriatory trade name: Viton) before this equipment be put on stream in gasohol or stock alcohol service.

Effects of Gasohol on Human Skin

During bottom samplings of a service station tank on December 30th, 1978, the author's right arm and hand were sprayed with gasohol. No additional discomfort or irritation was felt other than that felt with a no-lead bath. However, gasohol does tend to remove more skin oils than nolead gasoline.

Hazards of Gasohol

The potential fire-safety hazard of gasohol is tremendous. The storage of alcohol

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stocks and gasohol in above-ground tanks that share a common dike with other petroleum products courts disaster. The problem arises because the common fire-fighting foams used for fire suppression of petroleum products are not compatible with gasohol and stock motor-grade alcohol. A 90/10 gasohol blend will take on the characteristics of a straight alcohol fire. Standard foams stocked by rural and most metropolitan fire departments will not extinguish alcohol composed fires. A member of the National Fire Protection Association Committee 11B, the National Fire Code Committee on high expansion foams, has informed me that the only type of foams that he knows that will extinguish a petroleum-alcohol or straight alcohol fire are Aero Water PSC manufactured by National Foam and Light Water manufactured by 3M. These two foams are considerably more expensive than standard fire-fighting foams for petroleum products. This means there is little likelihood of any rural fire companies and the majority of municipal fire departments having these foams available.

Under ordinary circumstances and using standard safety precautions, normal physical contact with gasohol and stock alcohol will not be injurious to personnel. However, interesting results may occur if one breathes over the open fill stack of the alcohol blending stock tanks. A good tightfill cap and a good padlock are strongly recommended. All facetiousness aside, upon consultation with two physicians, one of whom specializes in the treatment of alcoholics, I have obtained several facts that are pertinent.

There is a growing body of information that motor-grade alcohol can be injurious to the physical health of some of those who work in the storage, handling, and blending of it, contrary to some of the information in the first report. Alcohol can be introduced into the body in 3 ways: by absorbtion through the skin, by ingestation, and by inhalation of the vapors. With respect to the effects of motor-grade blending alcohol stocks on the skin and the inhalation of vapors, extreme care must be taken to avoid as much as possible such exposure. It is absolutely essential that all personnel who are taking Antabuse, a drug used in the treatment of alcoholism, and/or Librium or Valium, which are tranquilizers, not come in contact with the alcohol because such exposure will cause adverse and possibly quite severe reaction in them. It is advisable that all personnel check with their personal physicians before being assigned to handle and/or blend this product. There are prescription and patent medications on the market which might give adverse or sideeffects reactions that only the physician could predict.

Problems of Storage

Attention is called to the fact that the relative humidity in the Washington, D.C. Metropolitan Area is considerably higher year-round than in many parts of this country.

Alcohol will hold 1.2% of its weight in water. Over this weight, the water and the alcohol will drop out to the bottom of the tank.

192 proof alcohol will separate from the gasoline in gasohol when additional water is introduced into the storage tank. A sample taken from a service station tank on December 30th, 1978, showed a 6.5% bottom consisting of rust scales, rust-colored water-alcohol, C3, and C4, covered by a narrow interface consisting of MIBK, C3, C4, and very light rust scales, topped off with rust-colored gasohol. This tank has a slight leak of ground water arising at the junction of a coupler attached to the

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fill stack to form an extension to the fill stack when the grade level was raised. This coupler was not tightened properly. Despite this known ground water leak, the entire volume of water within the tank was not directly attributable to the leak.

The majority of the terminals serving the Washington, D.C. Metropolitan Area experience very high product temperatures at their racks. This is caused by the pipeline volume and pumping speeds. Other parts of the country may not have this problem.

Rack temperature of Citgo NL-87 on December 30th, 1978, was 70°F. The average Washington National Airport temperature range for that date was 40°F. - 45°F. The average relative humidity was 82%. These conditions on a newly-filled underground storage tank cause condensation on the vapor surface of the tank. Each time product is pumped out of this storage tank, cold air is pulled in through the tank vent to replace the product removed, causing condensation to occur each time, too. Condensation also occurs during the cooling of the product in the tank to the surrounding earth's temperature. The combination of the water content already present in 192 proof alcohol and the water resulting from the condensation in the tanks due to the weather conditions prevailing in the Washington, D.C. Metropolitan Area lead to the recommendation that 192 proof alcohol not be used for service in the Washington, D.C. Metropolitan Area during the cold weather months. The exception to this is Washington, D.C. proper which has Federally mandated Phase II vapor recovery.

It is recommended that neither alcohol blending stocks nor gasohol be stored in above-ground tanks.

Due to the vapor pressure of gasohol, it is recommended that a P-V vent be placed on all tanks which have a slow product withdrawal rate in order to protect and maintain the octane number. Morrison Brothers Company of Dubuque, Iowa, is manufacturing a P-V vent for alcohol stock tanks and for gasohol tanks. It is a #548A 2-inch threaded 16-ounce pressure 1-ounce vacuum #6 mesh screen. Anyone wishin this vent must order it exactly as it is described above. The standard vapor recovery P-V vent is not applicable for gasohol service.

The four brands of water paste tested with a known tank water bottom all were blinded by the alcohol in gasohol. An inexpensive bottom sampler such as is manufactured by Universal Valve is recommended. This should be installed permanently on the tank gauge stick.

This past winter with its extreme temperatures presented yet another problem. A gasohol test made in upper New York State resulted in ice crystals forming in a product line leading from a submerged pump to a gasohol dispenser. The results of this were that the meter strainer was stopped up by the ice crystals attaching themselves to the strainer, thus the dispenser would not dispence product. However, this condition did not exist in standard gasoline pumps. It is the Society's feeling that the turbulent action of a gasoline pump will break up the ice crystals so they will successfully pass through the meter strainer screen. The temperatures during this test were 18°F. below 0°F. to 5°F. above 0°F. The product line was over 100 feet from pump to dispenser. There was no below ground temperature taken at that time because it would have necessitated breaking the pavement to get to the product line. It would seem that this problem could arise in any of the northeastern tier of States. The Society at this time has no information on whether this condition can or will exist in the Far West, i.e. Wymoning, Idaho, et al. because gasohol is not yet in use there and weather conditions there differ considerably from those in the northeast

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RICHMOND, VIRGINIA 23207

United States.

Pipes, Valves, and Fittings

Alcohol-based pipe dope is not recommended for gasohol and/or alcohol stock tank piping. On test swing joints made up with alcohol-based pipe dope seepage occurred in 45 days. The test conditions were: 90/10 gasohol pressurized at 25 PSI at 78°F. Ciba-Geigy 3000 UL fiberglass pipe and fittings (ASTM D2310/RTRP-11CZ) were tested under the same conditions and have shown no seepage and no ill effects.

Storage of Gasohol in Previously Used Gasoline Tanks

The alcohol in gasohol will remove very efficiently varnish, oxidized gasoline, and rust from the inside walls of previously used gasoline tanks. Because of this fact, any tank must be RESTED FOR 24 HOURS AND THE BOTTOM THIEFED before the gasohol can be dispensed. Sometimes it takes three fillings of the tank with gasohol before the tank walls are clean. Members should be aware that the gasohol will be rust-colored during this period and may cause some confusion in the customer's mind as to whether he is receiving a lead or no-lead product.

Recommended Practice for Installation of New Tanks for Alcohol and Gasohol Service

Any new tank must be graded down 3 inches to the fill stack at the "A" end of the tank. This is so that the water bottom can be thiefed out. The suction stub should not be any farther than 3 inches from the bottom of the tank. Under no circumstances should a fill stack be placed in the center of a tank unless an opening is provided to thief the tank at the low ("A") end. Due to the high vapor pressure of alcohol blending stocks, a P-V vent should be placed on the vent riser discharge. All fill stacks must have interior drop tubes. All gasohol storage tanks over 1,500 gallons must also have drop tubes.

Product Identification

Research develops the fact that there have been incidents of confusion between gasohol and no-lead gasoline when they are carried on a transport at the same time. This has arisen when transports equipped with API bottom-loaded adaptor faucets and sight glasses are carrying both gasohol and no-lead gasoline. Because of this, it is recommended that the alcohol stock tanks be dyed prior to blending.

A Word of Caution

In confirmation of the Society's positon that monitoring gasohol and its problems must be an on-going thing, on Wednesday, May 9th, 1979, I visited a service station in southeast Fairfax County, Virginia, that is currently marketing gasohol. The owner showed me a brochure and a sample of an additive to be added to gasohol at the service station. Among the many claims alleged by this brochure was one that stated that when the product was added to gasohol, it would enhance the horsepower of the vehicle and lubricate the valves of the engine.

I opened this sample and sniffed it. The following is my personal opinion after having sniffed: The odor was distinctly that of Varsol, a well-known solvent used in cleaning. There was a definite water layer at the bottom of the sample container which had a distinct silvery appearance. In the 1950's, Shell had a high phosphous gasoline whose water bottom took on this exact same silvery cast when thiefed. There is a very precise Federal law that prohibits the addition of additives to any and all fuels without the approval of the Environmental Protection Agency.

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Mr. ROSE. We now call James T. Griner, farmer from Nashville, Ga.

Mr. Griner, you may proceed at this time.

STATEMENT OF JAMES T. GRINER, FARMER, NASHVILLE, GA.

Mr. GRINER. Thank you, Mr. Chairman.

I am James Griner from Nashville, Ga. I have come here as a farmer to encourage our Government to help preserve a way of life.

It has been said that the American farmer feeds the world and that farmers are the backbone of the Nation. As one, I raise corn, soybeans, tobacco, and cows and attempt to exist with inflation on goods I purchase for farming and a recession on farm goods I sell.

As a graduate of Abraham Baldwin Agricultural College in Tifton, Ga., with a degree in equipment techology, I believe that the farmer must be continually searching for more and varied uses of his farm products to survive.

I speak not as a spectator or as an observer, but as one who has used mixtures containing methanol for 4 years in my tractors. It works, gentlemen.

I was reading the other night where a top energy spokesman for the Department of Agriculture says that alcohol could only supply 5 or 10 percent of our total energy needs. I doubt that statement. From my own experience with methanol, I find that any spark ignited engine can perform on gasohol.

Senator Bob Dole has stated that America is in dire need of a renewable source of fuel. He believes that part of the solution to our energy problem will be met with gasohol.

There is no doubt that we need to go full speed ahead to develop our energy sources and alcohol should not be overlooked or ignored. With this knowledge, gentlemen, I ask that you make loans available to finance construction of plants producing fuel alcohol.

God blessed this country with many renewable resources, and the American farmer has the ability to produce enough fuel as well as food for its people.

Thank you.

Mr. ROSE. Thank you very much. We appreciate your presence. Mr. Fithian.

Mr. FITHIAN. You mentioned your own work with methanol.

Mr. GRINER. Yes.

Mr. FITHIAN. How did you produce it?

Mr. GRINER. I purchased it from an industrial chemical dealer in south Georgia.

Mr. FITHIAN. Do you use it regularly?

Mr. GRINER. I am not using it at the present time.

Mr. FITHIAN. I am asking this as a practical question. I do not know anything about methanol, but I am told that methanol has a certain quality to it that causes a lot of engine problems as far as the spark is concerned and the rest of it. Do you have any information on that? What was your experience?

Mr. GRINER. Let me explain these particular tractors that I have used methanol in. They are high-powered tractors. Methanol is the cleanest burning fuel that I have put through them. I have tried mixtures of gasohol, 100 octane unleaded gasoline or aircraft gas,

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and I have tried mixtures of water and gasoline, and mixtures of gasohol.

The methanol, which is the only grain alcohol that I can get in my area, to me has been the best fuel that I have used. It will produce the most power. I buy it for 72 cents a gallon. I have less tear-ups with it. As far as I am concerned it is a fine fuel.

Mr. FITHIAN. Thank you.

Mr. ROSE. We want to thank you very much for your testimony.

We will call now Mr. Jerry C. Connors, American Automobile Association, Falls Church, Va.

Mr. Connors, you may proceed.

[The prepared statement of Mr. Connors follows:]

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JERRY C. CONNORS

MANAGING DIRECTOR, GOVERNMENT AFFAIRS

AMERICAN AUTOMOBILE ASSOCIATION

Good afternoon, Mr. Chairman. My name is Jerry C. Connors. I am the Managing Director of Government Affairs for the American Automobile Association. With me today are Richard F. Curry, Director of AAA's Environment and Energy Department and John Archer, the Assistant Director of our Legislative Affairs Department.

AAA is a federation of 199 affiliated automobile clubs with 964 offices throughout the U.S. and Canada. Our membership currently totals nearly 21 million motorists. Our by-laws require us to work for the welfare of car owners and other travelers and we believe it is patently clear that energy supply -- present and future -- is a paramount issue facing this Congress, the President, and all of us today.

We appreciate the opportunity to testify before you this afternoon on this very important piece of legislation, H.R. 3905, the Alcohol Fuel and Farm Commodity Production Act of 1979. The timing is certainly right. In some parts of the country lines of cars are forming at the gas pumps, and divisive disputes arise over where the blame for the shortages should rest.

AAA is convinced that our energy deficiencies must be attacked from three directions. First, we must make more intelligent use of our energy by conserving it in all practical ways. Industry has done an admirable job in demonstrating the potential of voluntary conservation. That shouldn't be surprising, however, as conservation makes good economic sense. It is apparent that most individuals have been slower to respond to this message. AAA believes, however, that if American consumers are given a consistent, forthright appraisal of the energy situation, they will also respond.

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AAA recognizes that there are two issues regarding gasohol which have raised some concern: energy balance and cost. We feel, however, that these issues will be favorably resolved as gasohol production technology improves and the cost of foreign oil increases.

For instance, it is acknowledged that the efficiency of traditional fermentation-distillation processes are being improved rapidly. Companies such as Archer-Daniels-Midland, currently the largest supplier of fuel alcohol, have improved the energy balance of their process to the point where it no longer produces an energy deficit. Other producers are utilizing energy innovations, such as continuous fermentation, solar drying, co-generation, and use of renewable energy sources, to achieve better balance between energy input and output.

Perhaps of equal significance is the fact that a number of new conversion technologies, reliant on methods such as acid hydrolysis and enzymatic action have shown promising results and may soon be employed commercially. They are designed to utilize a much broader spectrum of renewable feedstocks than are existing processes. And they are uniformly capable of achieving a positive energy balance.

Moreover, it may be that energy balance is a misleading qualifier of alcohol's utility as a motor fuel. We have long recognized in this country the overriding importance of access to certain forms of energy. For example, it takes three units of coal to produce one unit of electricity, but the vast need for electrical energy stifles objection to the gross imbalance which occurs in the process of generation.

Finally, it should be noted that although gasoline enjoys a current economic advantage over alcohol, that advantage will dissipate as oil prices continue to rise and alcohol technology continues to improve.

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Interest in the mass production of fuel alcohol is not yet widespread. Improvements in the efficiency of production, however, combined with competition among an increasing number of alcohol producers also will work to minimize the retail cost of gasohol.

This evidence of alcohol's potential led us to sponsor a gasohol demonstration for members of Congress. During a three-day period, 250 cars received fill-ups, consuming a total of 3,500 gallons of gasohol in the process. One hundred and twenty Senators and Representatives attended the function, or sent staff members to represent them. Representatives of the Administrative branch also accepted our invitation. "Report cards" were distributed to each visitor. Nearly 87 percent of the 135 persons who responded said they experienced good results with gasohol.

Today, AAA's own program has expanded from a purely informational base to one which includes more emphasis on in-use testing. Several of our club affiliates have conducted in-house tests. The most comprehensive is one started about nine months ago by the Auto. Club of New York, one of our largest and most active clubs.

Its purpose was to evaluate for AAA members the utility of gasoline/alcohol blends as fuel for passenger cars, particularly in an urban area. Two late-model vehicles--a 1978 Pontiac LeMans and a 1977 Pontiac Ventura--were used as test vehicles. A four-step program was devised. Stage one involved use of gasoline only. At 2500-mile intervals thereafter, the cars were tested with ethanol/gasoline blends of 10-90, 15-85, and 20-80 percent. At each test interval, diagnostic equipment was used to determine engine performance and the condition of plugs, points and carburetor. Test drivers

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logged performance characteristics throughout the test cycle.

The New York test successfully proved that gasohol can perform quite satisfactorily as a motor fuel in urban areas. The club's records showed that gasohol not only improved the gas mileage in test cars, but also caused no engine problems. As a result, the New York test is being expanded. Two additional vehicles will be tested for 10,000 miles - one with a 15 percent blend and the other with a 20 percent blend.

The New York club's test is continuing. One of the vehicles is now operating on 25 percent ethanol with no performance problems. The other is at a level of 30 percent - again no problems are reported. The New York club will continue to increase the alcohol increment until it experiences noticeable performance difficulties.

AAA would like to share its views with you on one more subject which is within the purview of this hearing. That is the matter of utilizing better the agricultural genius of American farmers to help increase fuel alcohol production.

AAA strongly endorses promotion of full agricultural production, with part of that production earmarked to develop alcohol fuels. This policy, if aggressively pursued, would eliminate the need for a set-aside program or other government supports for the commodities involved. More important, it would enhance the benefits derived from the federal government's agricultural subsidy dollar by maintaining a decent return for the farmer's labor and also effectively promote the infant alcohol industry at a time when such development is critically needed. This boost for gasohol would lessen our dependence on foreign oil, provide long-term insurance against reduction in supplies of foreign oil, and act as a

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deterrent against rapidly escalating oil prices by demonstrating the viability of a domestic, liquid fuels industry.

Moreover, the use of agricultural subsidies may allow the gradual phase-out of other government subsidies, particularly the current exemption from the federal excise tax on gasoline. If this exemption is not eventually phased-out, expansion of the gasohol industry will erode federal revenues earmarked for highway construction and maintenance, at a time when road and bridge deterioration is becoming epidemic.

In conclusion, it is our opinion that alcohol fuel constitutes an acceptable, near-term liquid fuel alternative with which the U.S. can help reduce its disastrous level of petroleum imports. Its use also can expand the supply of energy to which millions of Americans must look to maintain their mobility. And personal mobility, in terms of transportation, is an absolute imperative to assure the stability and progress of this nation and its people.

* * *

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Mr. CONNORS. I would like to add to my prepared statement that we must maximize the production of our existing energy sources and we must take the necessary steps to develop alternative sources so that we can reduce our dependence on imported oil.

Faced with these realities, AAA had concluded that it is imperative to identify one or more viable alternatives to fossil fuel as an energy base.

We began to evaluate possible alternatives and soon recognized that ethanol made from renewable sources stood out clearly above other candidate fuels. It mixes freely with gasoline, raises octane, is stable in solution, increases miles per gallon, reduced pollution, and can be made from a lengthy list of domestic sources, all of which are constantly renewable.

Encouraged by evidence which shows that alcohol, particularly ethanol, is an ideal supplement to gasoline, AAA has consulted with Members of Congress and the administration, industry and environmental representatives, as well as with our clubs in an effort to publicize the qualifications of alcohol as a motor fuel.

Through club publications millions of AAA members have become acquainted with this subject of alcohol fuels as well as with AAA's contention that such acceptable alternatives as alcohol must be developed and introduced as soon as possible.

Thank you, Mr. Chairman.

Mr. ROSE. Thank you very much. Are there questions from members? Mr. Bedell.

Mr. BEDELL. Let me emphasize one thing. Your one statement says, "It takes three units of coal to produce one unit of electricity, but the vast need for electrical energy stifles objection to the gross imbalance which occurs in the process of generation."

I think that is a very important statement because I think most of us would agree that if we could burn coal in our automobile in the form of alcohol it would certainly help us with our current energy problem.

Mr. ROSE. Thank you. Gentlemen, we appreciate your being here.

May we go now to Mr. Al Mavis, farm energy conservation coordinator, Illinois Department of Agriculture. Let me also invite Mr. William Soleta, the administrator, National Gasoline Commission, who was scheduled to be here yesterday but could not, to come to the table also.

Mr. Mavis, you may proceed.

STATEMENT OF AL MAVIS, FARM ENERGY CONSERVATION COORDINATOR, ILLINOIS DEPARTMENT OF AGRICULTURE, SPRINGFIELD, ILL.

Mr. MAVIS. Mr. Chairman, it is a real pleasure for me to be here and certainly a real compliment for my Congressman, Paul Findley, to be with me this afternoon to somewhat put emphasis on the Illinois position on this alcohol fuel program that is so vital at the present time for America. It is a pleasure for me to come and tell you that Illinois did open the leadership on this.

I will not read my paper because I addressed my paper to the statements and questions that Congressman Bedell had asked, but I will hit a few highlights and then I would like to point to a few

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things that have happened the last few days that are not quite in line with what is taking place in America.

Illinois did lead the commercialization and we started in November of 1977. The first public user of commercial gasohol in Illinois was Congressman Findley and he toured the 20th district in a mobile office equipped with a dual tank system in the fall of 1977.

The technology is here and there is no question that we are in a position now to produce large amounts of food alcohol and feed out of the same particular operation.

The widespread use of ethanol will in no way affect the soybean market as we see it. The corn farmer and the soybean farmer are pretty much interchangeable and we have had a large shift to soybeans in the last few years because the economics were so poor in corn production.

There will be large volumes of ethanol coming from sugar beets, sugar cane, and the other products. For the first 7 months in Illinois we only drove the alcohol that came from cheese whey.

The assessment as to your bill, Congressman Bedell, is that it seems so logical that we wonder why this concept has not been brought out long before, and we wish you the best success in doing whatever it takes to get this kind of a concept going in America.

From the standpoint of assessment of the alcohol's performance in engines, you people know and have read just recently where Chrysler and General Motors have announced that their warranty policies are acceptable on gasohol.

In the November issue of EPA out of Warren, Mich., they show in their report at least a two-and-a-half-point increase in octane so there is no question as to the octane boost.

In the next paragraph I want to point out that Illinois Bell—and it is attached to my speech—in their press release of April 18, mentioned that not only did they find great significant improvements in the engine performances of their fleet—gasohol over gasoline—but they showed a 4.48-percent increase in mileage.

In their small fleet in Illinois that means a savings of some 300,000 gallons of gasoline in a year.

The concept of cogeneration in Illinois is seen as a significant way in which the agricultural renewable ethanol will become an important part in cleaning up some of the problems we have in the environmentally dirty coals. If you will read that, we will have more on that as we go down the road.

We say that the Government can expedite this technology of getting renewable ethanol by a national commitment. We simply have not seen enough yes signs from the Government. We did see a sign from the President when he was in Des Moines last week, and we have seen some signs this week that there is some turning around in the Department of Energy. I am sorry to say that they did not think enough of the program to see that we get some funds to get the plants off the ground.

We are looking forward to tax investment credits for the plants and the distribution systems. We think that long-term low-interest loans of some type like the old REA program would certainly help.

Because of somewhat of a fear of government and industry, we think that you might want to think about a forgiveness clause in case the Government does change its mind about the use of renew-

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able fuels and simply get into a program where we have cheap petroleum again. This will give the people who make this investment some way to climb out in this event.

Certainly as for the national information program, this would report the benefits of this fuel. Let's get away from the concept that it will destroy or will hurt and let's talk about all the goodies that are involved in it.

I am going to switch off my speech and get over to a few comments relating to this subject.

The 4 cent subsidy was discussed here today. There was a lot of misconceptions about what that is all about. The 4 cent subsidy concept came out of Illinois. We had thought that anytime we put a gallon of renewable ethanol into an automobile system or into any system that we would save at least 1 gallon of foreign oil.

Dwight Miller, the top alcohol expert in the United States and the laboratory in Peoria called me one day and said "You are not quite correct. You have been lying to people. Really you save about 1.6 gallons."

But if I were to put that into a letter, I would have to argue with everybody in America, so he wrote a letter that said that every time you use a gallon of renewable ethanol, you save 1.1 or more gallons of foreign oil.

I passed that by the Illinois delegation. Senator Percy's staff picked that up and said that if it were true then we can afford to take the 4 cent Federal tax off the highway trust fund. We will not have the 4 cents in the trust fund, but it will not be Saudi Arabia. Really, the concept that put that 4 cent subsidy in was not a subsidy to do anything except to try to slow down the flow of American dollars overseas and bring back oil to fill a void. So the subsidy is not a subsidy, per se, and it should not be shown as 40 cents against the alcohol because it goes down to the consumer. The Senator told me one day that we may have to change the law to make sure the highway system does not fall apart. But one thing is certain. America will have that money here in its coffers. I think that is important.

DOE said today it was viable but yet they don't want to finance it, and we are concerned about that. They also talked about all the money they had in research and what they are going to do in the future.

In Illinois we have done so many things. We have yet to see the first dollar that has been involved in ethanol fuel plants or in research programs.

We have got to have fuel now. It is not a case of whether we would like to or not, it is simply a case of whether we are going to substitute ethanol or whether we are going to deny ourselves a way of life that we have been used to.

I was glad to see that Deputy Secretary Williams came to Illinois. It took 2 years. That is a shame. They came out to see what we were doing. We have been on the road long and hard. ADM is only 1 of 11 wet processing plants in America. There is no reason why there should not be a program coming out that would get an alcohol program involved behind every one of these food processors. So, then they can become a source of viable ethanol and this would help the food industry because it means they don't have to remanu-

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facture so many offgrade products to get them up where they are profitable.

Dr. Tsao's process has a great interest. If he and Gulf are successful, then it might be another step to go in anv alcohol plant in America, including ADM, and get a method of getting one more product out of the byproducts. We asked the Government to ask itself today if we are short of fuel. If we are, let ethanol fill the bill. We think it will. If we ask America if we want to change our way of life, and they say no, then we have got to have liquid fuel, and we again say that ethanol is the answer.

I want to thank you for allowing me to appear today. We in Illinois stand to help in any way we can.

[The prepared statement of Mr. Mavis follows:]

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State of Illinois
DEPARTMENT OF AGRICULTURE
Illinois Farm Energy Program
Emmerson Building / Illinois State Fairgrounds / Springfield 62706
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STATEMENT BEFORE HOUSE AGRICULTURE SUBCOMMITTEES
MAY 1979

IT IS INDEED A PLEASURE AND AN HONOR FOR THE GREAT STATE OF ILLINOIS TO APPEAR BEFORE THIS JOINT HEARING OF THESE HOUSE AGRICULTURE SUBCOMMITTEES, AND PRESENT THE ILLINOIS CASE FOR RENEWABLE ETHANOL.

ILLINOIS LED LARGE SCALE COMMERCIALIZATION OF RENEWABLE, CLEAN BURNING, AG ETHANOL AS A VIABLE FUEL. CLOSE COOPERATION AND FULL CONFIDENCE BETWEEN ILLINOIS GOVERNMENT AND INDUSTRY RESULTED IN ARCHER DANIELS MIDLAND OF DECATUR OPENING AN ETHANOL PLANT IN MAY OF 1978. AS THE USE OF ETHANOL SPREAD TO MORE THAN 20 STATES, ADM HAS SHOWN IT'S AMERICAN INGENUITY BY EXPANDING IT'S PRODUCTION MANY FOLD.

A LETTER FROM CONGRESSMAN BERKLEY BEDELL CONCERNING THIS MEETING ASKED THAT CERTAIN QUESTIONS BE ADDRESSED.

1. IS IT POSSIBLE TO PRODUCE ALCOHOL FUEL PROFITABLY USING GRAINS AND OTHER RENEWABLE RESOURCES?

ANSWER: WITH ALCOHOL PRODUCTION BEING ONLY ONE PART OF A FOOD, GRAIN, OR TIMBER PROCESSING INDUSTRY, IT IS NOT ONLY PROFITABLE, BUT OFFERS AN OPPORTUNITY FOR MANY PLANTS TO IMPROVE THEIR PRODUCTION SYSTEMS WHILE SUPPLYING AMERICA LIQUID FUEL.

2. ARE THERE TECHNOLOGICAL IMPROVEMENTS THAT CAN BE MADE IN THE ALCOHOL FUELS PRODUCTION PROCESS THAT WOULD FACILITATE THE ATTAINMENT OF A SO-CALLED POSITIVE NET ENERGY BALANCE?

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WHAT ASSUMPTIONS MUST BE MADE IN A COMPUTATION OF THIS SORT? HOW DOES THE ALCOHOL PRODUCTION PROCESS COMPARE WITH OTHER EXISTING FORMS OF ENERGY GENERATION IN TERMS OF THE NET ENERGY BALANCE?

ANSWER: PRESENT TECHNOLOGY AS DEMONSTRATED AND REPORTED BY ARCHER DANIELS MIDLAND, SHOWS FUEL ETHANOL PRODUCTION TO BE A NET ENERGY GAINER.

NO ASSUMPTION NEED TO BE MADE TO ARRIVE AT THIS ANSWER. HOWEVER, COSTS AND CHARGES NEED TO BE PROPERLY PLACED AND CREDITS PROPERLY SHOWN.

IN COMPARISON WITH OTHER EXISTING FORMS OF ENERGY GENERATION, THERE IS ONLY ONE FORM WHICH CAN BE COMPARED WITH FUEL ETHANOL. THIS IS HYDROELECTRIC. HERE THE WATER IS NEVER WORN OUT. CURRENTLY, ALL OTHER FUELS TOTALLY CONSUME NONRENEWABLES WHILE ETHANOL PLANTS CONVERT THE SOLID RENEWABLES INTO LIQUID FUELS.

3. WHAT IS THE RANGE OF USES OF THE HIGH PROTEIN CONCENTRATE THAT IS A BY-PRODUCT OF ALCOHOL PRODUCTION, AND HOW FLEXIBLE IS THE PRODUCTION PROCESS IN TERMS OF "INTERCHANGEABILITY" IN THE TYPE OF BY PRODUCTS THAT RESULT? WHAT IS THE LIKELIHOOD THAT WIDESPREAD ALCOHOL PRODUCTION FROM AGRICULTURAL COMMODITIES MIGHT RESULT IN A DISTORTION OF THE EXISTING PROTEIN SUPPLIMENT MARKET?

ANSWER: THE HIGH PROTEIN CONCENTRATE IS NOT ALL A BY-PRODUCT OF ALCOHOL PRODUCTION. WHERE GRAINS, MILK, AND MILK PRODUCTS ARE CONCERNED THE PROTEIN IS EXTRACTED AS A PRIMARY FOOD. EXAMPLES: REMOVE THE CHEESE, THEN DISTILL CHEESE WHEY INTO ETHANOL. (MILBREW, WISCONSIN) FROM CORN AND WHEAT REMOVE THE OIL AND THE GLUTEN, THEN PROCESS THE ETHANOL. WHATS LEFT THEN GOES TO THE FEED MILL FOR LIVESTOCK FEED. (ADM)

WIDESPREAD PRODUCTION OF ETHANOL FROM CORN WILL HELP THE SOYBEAN

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SITUATION. CORN PRICES WILL BE HIGH ENOUGH TO BRING ROTATIONS BACK INTO THE PICTURE. AGRICULTURE CAN MAKE THE NECESSARY ADJUSTMENTS IN CORN OR SOYBEAN ACREAGE IN A 12 MONTH PERIOD.

A LARGE PERCENTAGE OF ETHANOL WILL COME FROM SUGAR BEETS, SUGAR CANE, AND POTATOES WHERE THERE IS NOT PROTEIN PRODUCTION.

4. HOW DOES THE BY-PRODUCT COMPARE TO THE ORIGINAL GRAIN, AND WHAT ARE IT'S RELATIVE ADVANTAGES AND DISADVANTAGES?

ANSWER: THE BY-PRODUCT FROM GRAIN IS ENTIRELY DIFFERENT FROM THE ORIGINAL GRAIN. THE ORIGINAL GRAIN IS A HIGH STARCH, LOW PROTEIN. THE BY-PRODUCTS ARE HIGH PROTEIN, LOW STARCH WITH SHARPLY IMPROVED VITAMIN CONTENT BECAUSE OF THE YEAST AND BACTERIA IT NOW CONTAINS. IT IS EASY TO STORE AND SHIP, AND MAY ENTER FOREIGN MARKETS WITHOUT PAYING A TARIFF AS THE GRAIN DOES.

5. WHAT IS YOUR ASSESSMENT OF THE CONCEPT OF HR 2153 WHICH INVOLVES PAYING PRODUCERS TO GO INTO FULL PRODUCTION (WITH PART OF THE TOTAL PRODUCTION THEN EARMARKED AS FEEDSTOCKS FOR ALCOHOL FUELS PRODUCTION), AS OPPOSED TO THE CURRENT POLICY OF PAYING PRODUCERS TO SIMPLY IDLE THEIR LAND?

ANSWER: THIS IS SO LOGICAL THAT ONE WONDERS WHY IT HASN'T BEEN DONE LONG AGO. THE ECONOMIC IMPACT OF IMPROVING AGRICULTURE WHILE OFFERING AMERICA LARGE VOLUMES OF CLEAN BURNING, RENEWABLE, LIQUID FUEL MAKES SENSE TO ILLINOIS.

6. HOW WOULD YOU SUGGEST THAT THE CONSERVATION STANDARDS REQUIRED AS A CONDITION FOR PARTICIPATION IN THE PROGRAM BE DEVELOPED AND IMPLEMENTED?

ILLINOIS BELIEVES CONSERVATION PROGRAMS AND STANDARDS NEED TO BE SUPPORTED.

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7. WHAT IS YOUR ASSESMENT OF ALCOHOL'S PERFORMANCE IN AN INTERNAL COMBUSTION ENGINE, INCLUDING IT'S EFFECT ON OCTANE, MILEAGE, ENGINE PERFORMANCE, EMMISSIONS, AND THE LIKE?

ANSWER: ETHANOL PERFORMS EXTREMELY WELL IN CURRENT INTERNAL COMBUSTION ENGINES. IT IMPROVES THEIR PERFORMANCE THROUGH HIGHER OCTANE AND CLEANER BURNING WHILE PRODUCING INCREASED MILES PER GALLON ON THE GASOLINE IT IS BLENDED WITH. CONTINUING INCREASED DEMAND AT SALES OUTLETS DEMONSTRATES THIS. (SEE ILLINOIS BELL PRESS RELEASE)

8. WHAT IS YOUR EVALUATION OF ALCOHOL'S FUTURE IN TERMS OF WIDE-SPREAD MARKETING FOR USE IN GASOHOL, INCLUDING ANY IMPEDIMENTS THAT NOW EXIST?

ETHANOL FOR GASOHOL COULD BE SUPPLYING MUCH OF THE ADDITIVES FOR UNLEADED AND A GOOD PERCENTAGE OF OUR CURRENT SHORT FUEL IF THE U. S. WOULD HAVE STARTED MOVING WHEN ILLINOIS DID. ETHANOL WORKS IN CURRENT SYSTEMS WITH LITTLE OR NO MODIFICATION. 18 MONTHS, SEVERAL HUNDRED SELLERS, AND MILLIONS OF USERS DOCUMENT THIS. THE ONLY IMPEDIMENT IS LACK OF SUFFICIENT ETHANOL.

A NEW CONCEPT IS BEING DEVELOPED IN ILLINOIS THAT INVOLVES COGENERATION OF ETHANOL AND ELECTRICITY, THEN USING THE ALCOHOL TO SLURRY AND FRACTIONATE THE COAL. THIS PROCESS APPEARS TO HAVE THE ABILITY TO CLEAN UP LOW GRADE COAL AND PRODUCE A CRYSTAL CLEAR LIQUID FUEL SIMILAR TO HOME HEATING OR DIESEL FUEL.

9. HOW DOES ALCOHOL PERFORM IN BLENDS OF GREATER THAN 90% GASOLINE, 10% ETHANOL, INCLUDING PURE ALCOHOL AS A FUEL IN INTERNAL COMBUSTION ENGINES?

ANSWERS: ILLINOIS HAS USED MORE THAN 10% ETHANOL IN BOTH GASOLINE AND DIESEL FUEL. IN ADDITION, WE HAVE A DIESEL FARM TRACTOR OPERATING WITH A COMBINATION OF DIESEL, ETHANOL, AND WATER. AS ONE MOVES TO 20%

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CARBURETOR AND TIMING ADJUSTMENTS WILL RESULT IN IMPROVED PERFORMANCE.

LIMITED UNITS BURNING 80% ETHANOL AND 20% WATER ARE NOW BEING TESTED. SOME MINOR PROBLEMS HAVE OCCURED, BUT THEY ARE NOT UNSURMOUNTABLE.

10. WHAT IS THE PRESENT STATE OF THE ART FOR AN ONSITE ALCOHOL FACILITY OPERATION?

PRESENT ETHANOL PLANT OPERATION HAS FAR OUT STRIPED WHAT IS TO BE FOUND IN LIBRARIES. THE USE OF OUTDATED TEXTBOOKS HAS RESULTED IN MANY INCORRECT STUDIES AND REPORTS THAT HAVE BEEN PUBLISHED.

11. WHAT DO YOU PROJECT TO BE THE LEAD TIME FOR COMMERCIAL VIABILITY FOR THIS TECHNOLOGY, AND HOW CAN GOVERNMENT ASSIST IN EXPENDING IT?

ANSWER: THE PROGRAM IS COMMERCIALLY VIABLE NOW. PUBLIC ACCEPTANCE HAS SHOWN THIS. WHAT BETTER WAY TO GET AMERICA CLEAN, RENEWABLE FUEL THAN BY USING WASTE STREAMS (WOOD WASTE, CHEESE WHEY, ETC.) OR FOOD PLANTS. POTATOES, SWEET POTATOES, SUGAR BEETS, AND SUGAR CANE ARE SOURCES OF ETHANOL.

THE GOVERNMENT CAN EXPEDITE THIS TECHNOLOGY BY A NATIONAL COMMITTMENT INCLUDING IMMEDIATE SPELLING OUT THE TAX INVESTMENT CREDITS FOR PLANTS AND DISTRIBUTION SYSTEMS THAT PRODUCE RENEWABLE FUEL. LONG TERM, LOW INTEREST LOANS LIKE THE OLD REA FOR ALL SEGMENTS OF THIS NEW INDUSTRY WILL HELP. IT SHOULD INCLUDE A FORGIVEN CLAUSE IN CASE THE U. S. GOVERNMENT CHANGES IT'S MIND. A NATIONAL INFORMATION PROGRAM REPORTING THE BENEFITS OF USING AMERICA'S ONLY RENEWABLE ALTERNATE FUEL, ETHANOL, STATING IT'S EFFECT ON ECONOMY, ENVIRONMENT, FOREIGN TRADE, AND AMERICA'S WAY OF LIFE.

SOME ECONOMICS THAT ARE SIMPLE AND PERTAIN TO ILLINOIS WILL BE OF

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GREAT INTEREST TO YOUR COMMITTEE.

20% OF ILLINOIS CORN PRODUCTION IS 240 MILLION BUSHEL. SELL 240 MILLION BUSHEL AT $2.50 TO BUY FOREIGN OIL WHICH WILL RETURN $600 MILLION. IF PROCESSED, 240 MILLION BUSHEL WILL YIELD 600 MILLION GALLON OF ETHANOL. 600 MILLION GALLONS OF ETHANOL IS WORTH $900 MILLION. THIS WILL REPLACE 600 MILLION GALLONS OF FOREIGN OIL. 600 MILLION GALLONS OF FOREIGN OIL AT 50¢ IS $300 MILLION. WITHOUT ANY CREDITS FOR THE FUEL, THE FOOD, OR FEED, PROTEIN, INCREASED EMPLOYMENT, ETC., CONVERSION OF 20% OF ILLINOIS CORN PRODUCTION IS WORTH $600 MILLION AND MORE WHEN USED FOR FUEL THAN WHERE SOLD.

ILLINOIS NEEDS 600 MILLION GALLONS OF ETHANOL TO REPLACE 10% GASOLINE IN IT'S CARS. WHEN THIS 600 MILLION GALLONS IS USED FOR FUEL IN ILLINOIS IT WILL BRING IN NEW STATE TAX REVENUE OF $90 MILLION.

CAN AMERICA AFFORD TO WAIT ANOTHER DAY BEFORE IT GOES TO FULL STEAM AHEAD IN THE PRODUCTION OF RENEWABLE, CLEAN BURNING ETHANOL.

IF ANYONE IN WASHINGTON IS SINCERELY INTERESTED IN SOLVING THE ENERGY CRISIS IN THE BEST INTEREST OF THE AMERICANS, THEN IT IS IMPERATIVE THAT THEY GET OUT INTO THE GRASS ROOTS AREAS OF THIS COUNTRY AND SEE FIRST HAND WHAT IS ACTUALLY HAPPENING.

WHAT IS THE PRICE OF GASOLINE WHEN YOU'RE OUT? WHAT IS THE PRICE OF FREEDOM WHEN WE DEPEND ON FOREIGN OIL?

IN ILLINOIS WE SAY, "CONSERVATION BY SUBSTITUTION, NOT DENIAL." SO PLEASE GENTLEMEN, TAKE WHATEVER STEPS ARE DEEMED NECESSARY TO IMPLEMENT A NATIONAL ALCOHOL PROGRAM NOW.

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Mr. ROSE. Thank you.

Mr. Findley?

Mr. FINDLEY. Thank you, Mr. Chairman.

Mr. Mavis, if you were able to set Federal policy all by yourself about gasohol, and you had it right in your hands, what would you do first?

Mr. MAVIS. On the ethanol program, I would set a task force into the field immediately to get in touch with people like Staley and Quaker Oats and all the grain processors, and Corn Products, International. I would have a program going within a very few days with the implementation of an alcohol system in every one of these plants. They all have Johnny streams.

I would get to the sugar industry where we have a terrific problem. We have eight sugar beet plants that they tell me will not reopen next year. I would have an alcohol program set up to go in those. Those plants in the off-season can convert things like potatoes because most of them are in the same area as sugar beets during the growing season.

I would have an alcohol program going immediately into the systems that are in trouble. That includes the sugar beet farmer, the potato farmer, and many, many waste streams that are standing by waiting to go.

Mr. FINDLEY. What should Congress do next to advance this idea?

Mr. MAVIS. I think the thing is that you must have a way to do this. We are talking about REA seed money and loan guarantees. There is a real fear about government. If you people would give us the go-ahead then it is a case of the EPA dragging its feet. We do not have a uniform government policy which says that we are out of fuel and ethanol if important. Congress must take that step to commit themselves to a program that will fly. Then they can guarantee the industry it will not have its chance cut off.

Mr. FINDLEY. Thank you.

Mr. ROSE. Mr. Bedell?

Mr. BEDELL. Mr. Mavis, are you aware of any disparity that now exists in the rates of transportation of alcohol produced from grain and other renewable resources as compared to alcohol produced from ethylene?

Mr. MAVIS. Congressman, there is a very serious rate discrepancy in the freight systems. Fuel that would move from our area, or ethanol from grain production, has about $1.21 a hundredweight freight discrepancy against ethanol produced from petroleum going to the west coast.

We have California people interested in exporting Illinois alcohol on to the west coast. If you figure that out at $1.21, there is about a 16 cent penalty. The railroads tell us that the reason that is is because the ethanol from fermentation is different than the ethanol from the pipeline. The chemical formulas are exactly the same.

Mr. BEDELL. Thank you.

Mr. ROSE. Mr. Mavis, thank you very much.

We will now call as a witness, Mr. Hal Bernton. Mr. Bernton is associated with Jack Anderson, syndicated columnist, Washington, D.C.

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We are glad to have you, Mr. Bernton.

STATEMENT OF HAL BERNTON, STAFF REPORTER FOR JACK ANDERSON, SYNDICATED COLUMNIST

Mr. BERNTON. Good afternoon, Mr. Chairman, and members of the subcommittees.

My name is Hal Bernton, and I am a staff reporter for the syndicated columnist, Jack Anderson.

In the summer of 1977 our office began an investigation of alcohol fuels, a little-known energy source, shrugged off by top policymakers and omitted in President Jimmy Carter's energy plan. Since then, we have followed alcohol's torturous journey through the Washington bureaucracy—a journey resisted by many Energy and Agriculture Department officials.

Alcohol fuels have been around since the first automobile. Henry Ford hoped that alcohol fuels could help rural America by providing farmers with the home-grown fuel they lost when oat-powered horses were pushed out by petroleum-powered tractors. Ford equipped his early Model-A's with adjustable carburetors to permit the cars to run on alcohol blends. He helped finance the construction of a Kansas alcohol plant.

We have found ample documentation of an impassioned 1930's oil industry campaign to discredit alcohol fuels. We have copies of pamphlets, books, and speeches distributed by the oil industry to combat what the American Petroleum Institute viewed as the alcohol advocates' "determined propaganda trying to force their ideas upon the country."

One example of this was put out by a State petroleum council which said:

> The time to lock the stables is before the horse is stolen. Forced use of alcohol gasoline threatens to rob oil men and their customers, including farmers, of hard-earned cash. This unsound scheme can never be put over in Iowa if oil men will take only 5 minutes to learn the ABC's of alcohol gasoline. In other words, lock the stable before the horse is stolen.

That is from a 1930 document.

An ambitious national alcohol program was launched during World War II when the United States desperately needed alcohol to produce synthetic rubber. During this period, U.S. ethyl alcohol production shot up to 600 million gallons a year—nearly four times the 1942 production level.

Today the oil industry is divided on the alcohol fuels issue. Some companies, badly in need of octane boosters, have taken a hard second look at both ethanol and methanol.

Oil interests, for example, as we heard earlier, have agreed to buy the total output of a distillery being built in Rapid City, S. Dak. Continental Oil, Inc., supported early Nebraska State research tests on ethanol.

But Mobil Oil believes that "growing, fermenting, and distilling grain consumes more energy than it produces." Chevron accuses congressional advocates of "scraping the cobwebs off an idea that failed 40 years ago." Gulf Oil concludes that a government mandate of alcohol fuels: "It simply would not be in the best interest of our country."

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Nevertheless, all three of these companies are closely monitoring technological developments in the alcohol energy field. Mobil researchers are developing a process to convert alcohol into gasoline while Gulf Chemical Co. has perfected a process which breaks cellulose down to sugars that can be fermented into alcohol. Chevron has quietly expressed interest in a new membrane technology developed at Columbia University which would significantly reduce the energy needed to distill alcohol. Exxon and Texaco are selling 20 percent blends of alcohol fuels to Brazilian motorists.

The U.S. Government also appears to be taking a second look at alcohol fuels. Jimmy Carter, our President, confessed to an Iowa audience that "the Government forgot about gasohol * * * so did the experts." He then announced Federal assistance to finance 100 new small alcohol distilleries.

As the movement for alcohol fuels matures, as I think the testimony has borne out in the last 2 days here, two major trends in the industry appear to be surfacing. Advocates of small-scale technology see low-cost farm stills designed to produce from 150- to 190-proof alcohol coming rapidly onto line. These stills will help a farmer, or a small group of farmers, achieve a new measure of energy independence. This low proof alcohol can be used in specially modified trucks, trucks, and cars, without the addition of any gasoline. The primary need here appears to be for technical training programs for farmers and stepped up research and development for small-scale stills.

The other major trend is toward the construction of large-scale distilleries—certainly we have heard much testimony to that effect today—designed to produce 199-proof anhydrous alcohol for gasoline blends. These distilleries can be constructed in rural areas, and will make use of surplus grains, potato culls, wood, garbage, and farm wastes.

Certainly many rural groups are trying to raise the substantial amounts of investment capital necessary for such distilleries. They want local control over these projects—many of the groups do—so that the income generated in this new industry will remain in their area. However, these groups are finding it difficult to raise investment capital while the Agriculture Department actively fights gasohol.

Tom Sands, special assistant to Agriculture Secretary Bob Bergland, recently told me that the Department's position has shifted from one of active opposition to neutrality. Technical—but not financial—assistance will now be offered to farmers interested in alcohol fuels. Even though the Carter administration officially endorses alcohol fuels, its top USDA officials are still apparently unwilling to back a major farm alcohol energy program.

The Government may also find it necessary to encourage the development, along with gasohol, of a truly renewable farm system. The current crisis in American agriculture has encouraged intensive monocropping of staple grain crops. The only way many farmers can survive is to coax every last ear of corn and bushel of wheat out of an acre of land.

This intensive cropping and the heavy use of chemical fertilizers and pesticides is putting many farmers on what Secretary Bergland has called "a collision course with disaster." The USDA re-

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ports that soil erosion is occurring at "twice the rate considered to be acceptable" while some agricultural scientists are concerned that the soil's fertility may be declining.

There is a danger that a massive demand for agricultural products generated by a strong alcohol fuels industry could accelerate these trends. Indeed, if corn stalks and other cellulose material are used as an alcohol feedstock, some farmers in financial trouble might be tempted to send all of these materials to the distillery rather than return a portion back to the land in order to maintain long-term soil fertility.

On the other hand, the alcohol fuels industry, by providing the farmer with a new source of revenue, could help make the shift away from intensive monocultures toward a more balanced system of crop rotation. The latter system would help maintain the stable agricultural base needed to provide both food and fuel for future generations of Americans.

Thank you.

Mr. ROSE. Thank you. That was an excellent statement.

Mr. Fithian?

Mr. FITHIAN. I have a brief comment. I appreciate what you and Mr. Anderson have been doing to expose a number of areas in this field.

Let me add a little bit of information to page 4 of your prepared testimony for your own use.

There has been a good bit of work done surrounding the Tsao process with regard to the very question you raise on page 4 which is the temptation to rob the soil's fertility.

The chemical process that will be used for the conversion of corn stalks and agriculture residue does not consume the soil fertilizers that are in stocks, like the potash and the rest. That can, in fact, be a byproduct that is simply given back to the farmer free. That is never factored into the price.

Second, and this is an important point, I think, for all of us to remember. The soil tilth is a matter—you have to have a certain amount of fiber to keep the soil loose enough to not become packed for the years. But, with the increased use of chemicals in the fertilization that we have developed over the last 4 to 5 years, we are now producing somewhere in the vicinity of 300 percent per acre over and above what is needed for soil tilth. So, if you harvested, let's say in the real heavy producing area of the corn belt, you would run 2 to 3 tons per acre of corn stalks. If you harvest two-thirds of that, let's say, then that would be about 2 tons per acre in the very heaviest part of it—or even a ton and a half per acre. You will have all the soil tilth that you ever needed along the way.

The economics of that computed at $30 per ton for corn stalks is this. If you harvested a ton and a half and leave a ton on an average 2½ acres of stalks, what you are doing is increasing the return per acre—$45 for the corn stalks less the delivery charges and whatever it takes to put them in a delivery capacity or mode.

So, I would just want to alleviate your particular concern there. That has been taken into consideration and it is easily surmounted.

Mr. BERNTON. I noticed the bill itself did include a section on improving good soil conservation.

Mr. FITHIAN. Thank you.

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Mr. ROSE. We appreciate your interest in this, Mr. Bernton.

Mr. BERNTON. I have one more point that was raised earlier by Mr. Cray. He talked about petroleum displacement in industrial alcohol.

I think that one factor that was not brought up that you have to look carefully at is this. How much of synthetic petrochemicals can be extracted from a barrel of oil? I don't believe it is over 50 percent. Therefore, I doubt that you can displace the total barrel of oil by displacing just the amount taken for petrochemical use.

Mr. ROSE. Thank you very much for your comments.

I am always amused at the Department of Energy being concerned about this. I learned the other day—and I am not sure whether it has been in the press or not—that the Department of Energy put 18 million barrels of oil in a salt dome in Louisiana without first checking whether or not this salt dome had any cracks in it. In other words, it was not gas tested to see if it would hold the oil. Without having any mechanism to get the oil out, they did it.

We will now call our next witness.

Mr. Soleta, you may now proceed.

STATEMENT OF WILLIAM R. SOLETA, ADMINISTRATOR, NATIONAL GASOHOL COMMISSION, INC.

Mr. SOLETA. I have a prepared statement here. I will submit it for the record, if I may, Mr. Chairman.

Mr. ROSE. Without objection, your entire prepared statement will be inserted in the record.

Mr. Bedell probably has questions. Mr. Bedell.

Mr. BEDELL. Mr. Soleta, are you acquainted with the Kentucky study where they did some feed work with Distillers Dried Grain?

Mr. SOLETA. Yes, I am.

Mr. BEDELL. Would you be able to tell us a little bit about what that study shows?

Mr. SOLETA. What that really was was a program where they substituted a program such as this and it took 100 bushels of corn, for instance, along with hay and ran it down through a feed ration program and came up with 474 pounds of beef. But instead of going that route they looked at what we are talking about here now—the gasohol route—and they took 80 bushels of corn, and then they took 20 bushels of that original 100 and ran it through the alcohol plant first.

Then they brought the Distillers Dried Grain and put it into the ration with the other 80 bushels of corn and they discovered that they did not get 474 pounds of beef, they got 535 pounds of beef with that ration. It was an almost 13-percent increase in beef production by taking 20 percent of the corn and running it through the alcohol plant first.

The interesting thing is that you had a bonus not just of 13-percent beef, but you also had a bonus of 52 gallons of alcohol. This is what this kind of a program can do for us.

Mr. BEDELL. Do you know if that has been confirmed by any other studies or any other documentation? My understanding is that there is some technical explanations of this such as the Distiller Dried Grain bypasses the rumen of the cow's stomach somehow.

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Mr. SOLETA. That is correct. They are discovering that now. This is 20 years later. They are discovering that they have this special growth factor and so forth—this bypass arrangement.

I would like to say this. About 1 year ago I started with the A.O. Smith Harvester people, and I think you should contact them for input in this. That was to get them interested in seeing what they could with Distillers Dried Grains. I just had Dr. Vetter call on me Thursday of last week and he said they are prepared now to show formulas for reconstituting corn stover and hay, and barley straw or wheat straw with the Distillers Dried Grain and come up with a beautiful ration for cattle.

I discovered Monday night of this week when I talked with a fellow from Canada that they have done the research with straw and they find that they come up with a tremendous cattle ration using the Distillers Dried Grain wet. It comes out of the alcohol plant wet and they reconstitute it with straw from wheat or barley, and they come up with a beautiful feed.

Mr. BEDELL. So, at least there is some indication that we can take some of this alcohol from our feed grains and not lose the original feeding value when the by-product is fed to the cattle.

Mr. SOLETA. Yes. Actually, what you are doing is that you are expanding our ability to produce more beef in the United States because we will extract the alcohol out of the feed grains that are excess—the excess starches and sugars—and take the Distillers Dried Grain and put that with the corn stover and thereby increase the beef supply besides getting the fuel.

Mr. BEDELL. Thank you.

[The prepared statement of Mr. Soleta follows:]

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NATIONAL GASOHOL COMMISSION, INC.
SUITE 5
521 SO. 14th STREET
LINCOLN, NEBRASKA 68508

STATEMENT BY BOB SOLETA, ADMINISTRATOR
OF THE NATIONAL GASOHOL COMMISSION, INC.
BEFORE THE HOUSE AGRICULTURE SUBCOMMITTEE

MAY 15, 1979

Mr. Chairman, it is with pleasure I am here to endorse the common sense concepts of producing "renewable agricultural raw materials" for food, feed, fiber and feedstock materials for commercial industrial uses. As a Minnesota farmer-businessman doing agribusiness consulting work for the Minnesota Dept. of Economic Development in the fall of 1977 and spring of 1978, I made these similar proposals.

For over a century, the United States agricultural system has proven its capacity to produce food and feed far beyond the ability of its markets to consume them.

My conclusions are that our agriculture system has been "misidentified" as a food production system, when in fact and principle, it is an "energy" production system. It produces energy known as foods for human consumption, feed energies that are fed through livestock converters that convert the feed to food for people. The excess productive capacity, that we have for years idled, is our ability to produce other renewable energy products such as ethanol, methanol, methane gas, solid cellulotic materials (wood and compacted crop wastes), also renewable materials for chemical and oil uses.

When agriculture is regulated to the production of food, feed and fiber, its excess productive capacity becomes a political and economic problem

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to the producer, consumer and the government. These surpluses are viewed as blessings and liabilities, often used for both domestic and foreign policy purposes - usually to the detriment of the American farmer.

With the full production of the customary food-feed crops, the excess oils, starches and sugars can be converted to commercial and energy uses. The conversion of excess crops to alcohols increases the supplies of high quality food and feed protein products for human or livestock consumption while stabilizing prices and supplies for worldwide marketing.

The current "feed grain reserves" aren't readily convertable to human food uses. Therefore, the on farm and small community sized alcohol plants should be used to expand the supplies of a high quality livestock feed and alcohol for energy purposes. More sophisticated plants can produce human quality food elements from cereal grain (just like the soybean crushing and oil refining plants have done for soybeans and sunflowers) also feed for livestock, chemicals and energy for commercial uses. The elements of the converted grains can be placed in feed or food reserves at less storage cost and be more readily usable for food purposes.

The byproduct of this conversion process is "alcohol". The added reward is concentrated nutrition for the protein hungry world.

With fossil fuel supplies headed for energy bankruptcy, the need to convert to "renewable energy resource materials" is <u>now</u>. Start with surplus agricultural starches and sugars and work towards energy farming as technology improves.

The surplus, overripe, underripe, and out-of-condition products being removed from the present marketing system would <u>improve</u> the quality of domestic and export quality products.

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The principle of converting excess starch/sugar being offered by H.R. 3905 is applicable now to any of the surplus crops, including wheat, barley, rye, oats, milo, sorghum, fruits, vegetables, root crops and sugar crops such as cane and beets.

Students of "basic economics" know that all new "true wealth" is generated on the land with production of raw materials from farming, forestry, fishing and mining. To shut this renewable money production system down by faulty political or economic policies and paying the producers not to produce, works a double destruction on the economic survival of this nation. The Arab nations selling nonrenewable energy products at parity values is viewed by some as "good business". Our United States domestic coal, oil, gas and uranium producers now want the same marketing rights. If this is acceptable for our nonrenewable resource producers, why is it not acceptable business for a renewable energy and materials producer such as agriculture?

Government leaders who oppose using "fractionating alcohol plants" to release the product elements of crops for better utilization and marketing, will next call for the shutdown of our soybean and sunflower crushing plants. The analogy is the same.

The starving, malnutritous people of the world with starch bloated bellies and protein starved brains must cry in disbelief at the opposing testimony to this legislation.

"Motivating" agriculture into the production of all kinds of renewable energies for human use is the basis of future survival in the face of fossil fuel bankruptcy. Vote "yes" for survival. Vote "no" for energy and economic bankruptcy.

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NATIONAL GASOHOL COMMISSION, INC.
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STATEMENT BY BOB SOLETA, ADMINISTRATOR
OF THE NATIONAL GASOHOL COMMISSION, INC.
BEFORE THE HOUSE AGRICULTURE SUBCOMMITTEE

MAY 16, 1979

On December 6, 1978, I testified and presented information before the Alcohol Fuels Review Panel hearing, here in Washington. Rather than bury the panel deeper in numbers and confusion, I presented material to say a "basic energy policy" is necessary before direction and progress could be made in solving our energy problem. Now again, I repeat, to this date the United States doesn't have an energy policy in writing based on principle. It could have one governed by two principles as shown below.

Principle One: First, identify the kinds of energy available as nonrenewable or renewable. The nonrenewable being coal, oil, natural gas and uranium. The renewable being sun, wind, water and vegetative matter.

The nonrenewable energies, like banked or borrowed money reserves, must be protected and replaced by renewable energy income, just as renewable monetary income keeps a person's farm, business or country from going monetarily bankrupt.

Principle Two: Give common sense political and economic advantages to the use of renewable energies over the use of nonrenewable energies. Renewable energy production must be expanded and priced in such a manner that the consumer will use them in preference to bankrupting the nonrenewable energy supplies that are needed for the future generations of Americans.

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Note: Banked nonrenewable energy reserves, like borrowed or banked monetary reserves, should only be used to the extent that they get us into renewable energy income production position.

Adopting of Principles One and Two to Create a Third Principle

Principle Three: When we define an "energy policy" based on the first two principles, we automatically create an "agricultural policy" because they are inseperably one and the same.

We must place in writing and adopt into law, these basic energy and agricultural policies, do this while supplies and economics are on our side, if not, nature will force it by her own law of supply and demand.

Act as informed leaders, informed and educated in the natural laws of supply and demand rather than be influenced by special interest groups feeding on the greed of the moment.

A "national/international energy policy" with the effect of constitutional law will make subsequent laws and policies easier to formulate, understand and put into effect.

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NATIONAL GASOHOL COMMISSION, INC.

SUITE 5
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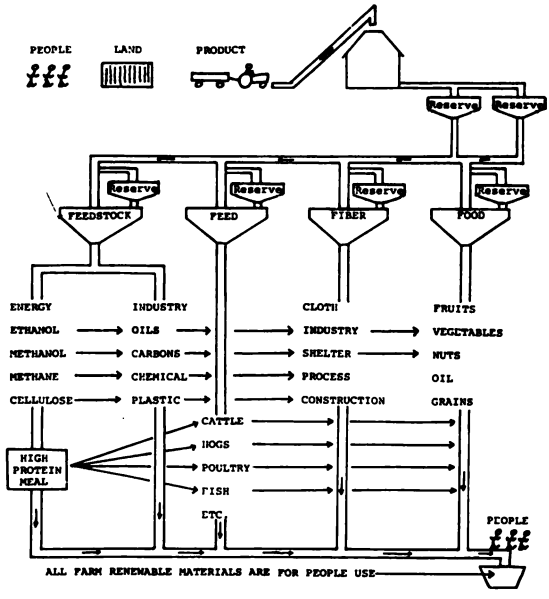
PREPARED BY:
BOB SOLETA
EXECUTIVE DIRECTOR

FARMERS, THE ENERGY PRODUCERS: A POUND OF FOOD PRODUCT FOR EACH POUND OF ALCOHOL PRODUCED.

FARMING FOR FOOD - FIBER - FEED - FEEDSTOCKS
(For Commerce & Industry)



Prior to the discovered uses of the fossilized energies such as coal and oil, the farmers provided all the forms of energy.

Farming has been temporarily misidentified as just a food production system. Upon reexamination, we see it to be the renewable energy system now in operation producing food energy, feed energy, and now fuel energy (alcohol).

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Mr. ROSE. We will now call Ms. D. Jane Drennan.

Ms. Drennan, please identify the people at the table with you.

STATEMENT OF D. JANE DRENNAN, ATTORNEY, McDERMOTT, WILL & EMORY, WASHINGTON, D.C.; ACCOMPANIED BY MICHAEL S. GRIESSER AND EDWARD A. PECHAR, ATTORNEYS, SCHENLEY DISTILLERS, INC.

Ms. DRENNAN. Thank you, Mr. Chairman.

I am D. J. Drennan, a member of the law firm of McDermott, Will & Emory. To my right is Michael Griesser. Next to him is Ed Pechar. They are with Schenley Distillers.

I want to thank you and the other members of the subcommittees for affording me this opportunity to appear before you today on behalf of Schenley Distillers, Inc.

I have a prepared statement which I will submit for the record, and I will present as quickly as I can the highlights of our testimony.

Mr. ROSE. Thank you. Without objection, your entire prepared statement will be inserted in the record.

Ms. DRENNAN. The bill which Congressman Bedell has sponsored we consider a significant legislative measure for the development of the economical and technical feasibility of alcohol fuels. The essential parts of this bill which create incentives for production of alcohol fuels are (1) the availability of loan guarantees for construction of alcohol fuels production facilities, and (2) the stabilization of the pricing of agricultural crop production dedicated for feedstock for alcohol fuels plants.

My purpose today is to suggest an amendment to this legislation and also to apprise you of a problem relating to energy sources.

Specifically with regard to our amendment we have this to say. In order to create sufficient financial incentives for the distillery industry and other companies as mentioned today, we would suggest that the bill should provide for a loan guarantee program available for new plant facilities, and in addition, for retrofitting existing plants.

The current bill only provides for new construction. There are many existing plants that currently produce 190 proof alcohol. Funds should be made available to retrofit these plants which would cost approximately between $600,000 to $800,000.

In addition, we think the funds should be made available for the installation of energy saving devices. Concurrently with that and the use of these distillery operations which are currently dependent for the most part on fuel oil and natural gas, we understand the overall energy purpose to be one of converting to renewable energy sources.

Therefore, we suggest that the loan guarantee program should be expanded to provide available funds so that during the interim period whereby fossil fuels are being used, that the companies could convert to these technologies that have been referred to today.

Without such a program of expanding the loan guarantees the current level of ethanol production for gasohol will not rise dramatically.

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As stated today earlier, a program that President Carter has established under the rural initiatives is a very small program of $11 million for 100 projects. By taking existing industries and encouraging them to participate in producing ethanol now is the way that we can offset the current shortage of gasoline.

According to Undersecretary Alm's testimony today, the current production of ethanol is around 200 gallons—excuse me, it is 20 million gallons. Schenley itself has the capability to produce with their excess capacity at least 50 percent of what is currently being produced.

The financial incentives are necessary and an amendment to this bill would provide the necessary impetus for Schenley and other distilleries to enter into the immediate production of ethanol.

The second major point that we would like to raise today so that you can be aware of it is this. Distilleries for the most part are dependent on natural gas and fuel oil for the production of alcohol. In 1969 distilleries which had historically been on coal converted to fuel oil and natural gas due to the onset of the Environmental Protection Agency regulations.

Schenley and other distilleries are now aware of the diminishing of fossil fuels, fuel oil, and natural gas, and they are investigating the potential for renewable fuels.

However, there is a need for them to have the opportunity to implement their idle capacity to assist in offsetting the gasoline shortage.

The only means by which they are able to do that is by having an adequate natural gas supply. Currently most distilleries receive natural gas on an interruptable basis and they are the first to be curtailed when the supplying pipeline experiences a shortfall in the supplies necessary to meet its contractural commitments.

Most of the distilleries have dual fuel capability, as I previously mentioned. However, in order to produce gasohol economically, natural gas must be utilized. Despite our attempts with various regulatory agencies, we have been unable to receive an assurance from DOE or its counterparts that natural gas will be available for gasohol. This is in direct conflict with some of the current policies that are emanated from DOE.

As you may be aware, ERA has come out with current rulemakings in which the Federal Energy Regulatory Commission also participated, which encourages companies of all kinds to reduce their use of fuel oil and to use natural gas. This is due to DOE's projection of the current gas glut.

Recently they authorized the displacement of fuel oil by Consolidated Edison in New York for the generation of electricity with natural gas. However, we are having difficulty in explaining to them that natural gas as used in distilleries today can offset the shortage of gasoline.

We would like to ameliorate the current shortage in conjunction with the administration's program of rural initiatives. In addition we would like to state that we are more than willing to assist any agricultural farmers for agricultural cooperatives in implementing the technology they may need under the rural initiatives program.

However, we did want to bring to your attention that Schenley and other distilleries in this country have the capability now to

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retrofit their plants and produce ethanol within the next 6 months which can go a long way toward extending our petroleum reserves, assisting our balance of payments, and reducing our dependence on foreign supplies.

If you have any questions, I would be happy to answer them. Thank you.

[The prepared statement of Ms. Drennan follows:]

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STATEMENT BY D. JANE DRENNAN

BEFORE THE

HOUSE COMMITTEE ON AGRICULTURE

SUBCOMMITTEE ON DEPARTMENT INVESTIGATION, OVERSIGHT AND RESEARCH

SUBCOMMITTEE ON CONSERVATION AND CREDIT

SUBCOMMITTEE ON LIVESTOCK AND GRAINS

Mr. Chairman: I am D. Jane Drennan, a member of the law firm of McDermott, Will and Emery. I would like to thank you and the other members of the subcommittees for affording me this opportunity to appear before you today on behalf of Schenley Distillers, Inc.

The bill sponsored by Congressman Berkley Bedell, the National Alcohol Fuels and Farm Commodity Production Act of 1979, is a significant legislative measure for development of the economical and technical feasibility of alcohol fuels. The essential parts of the bill -- which create incentives for production of alcohol fuels -- are (1) the availability of loan guarantees for construction of alcohol fuels production facilities and (2) the stabilization of the pricing of agricultural crop production dedicated for feedstock for alcohol fuels plants. However, it is not likely that the benefits of this legislation will be reaped until the mid-1980's. The current shortage of gasoline which is causing consumer panic demands that greater quantities of gasohol become available as quickly as possible.

In appearing before you today my purpose is to suggest that the proposed legislation should be amended to create the financial incentives for the distilling industry necessary to stimulate immediate production of ethanol from grain -- which is then blended with gasoline to form gasohol for use as a motor fuel.

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The loan guarantee program available for new plant facilities should be expanded to include loan guarantees for capital costs incurred by existing facilities for modifications necessary to produce 200 proof ethanol. Loan guarantees should also be available for costs associated with (1) the installation of energy saving equipment, such as heat recovery devices; and (2) the replacement of existing furnaces using fossil fuel with renewable fuel based furnaces. Grants or even low interest rate loans would provide a greater incentive in reducing the reluctance of many industries to make the necessary capital investment for the production of ethanol for gasohol.

As recognized by Secretary Schlesinger in his testimony before the Senate Interior Appropriations Committee on March 1, 1979, distilleries have existing idle capacity which could be utilized immediately to produce ethanol. Current excess capacity to produce 190 proof non-beverage alcohol is laying dormant. In testimony before the House Subcommittee on Energy Development and Application of the Committee on Science and Technology last week, DOE's representative stated that there are sufficient raw materials to produce 600 million gallons of ethanol or 6 billion gallons of gasohol immediately if production capacity were made available. A program of financial incentives could create additional production capacity needed.

The many benefits of gasohol are apparent and need not be restated. The ability of consumers to use gasohol in place of

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premium unleaded gasoline in regional markets can no longer be ignored in view of the spot shortages which are occuring throughout the United States.

The distillers at this time are willing, but unable to produce the ethanol necessary to make gasohol unless availability of natural gas is assured. Distilleries came to this nation's aid in World War II in helping to solve the rubber crisis and they can do it again today to alleviate the gasoline shortage. The shortage of gasoline can be immediately offset by an industry which is experienced in alcohol fuels production; but, there is a need for congressional support to make the administrators of our national energy policy responsive to this opportunity. The production of ethanol with natural gas would not only be consistent with that policy but, also would further reduce consumption of petroleum-based products.

There is no question that the operation of distilleries to produce ethanol for gasohol is economically feasible. Distilleries current production costs of 190 proof non-beverage quality spirits range from $1.26 per gallon to $1.41 per gallon when natural gas is used as an energy source. Although the production costs would be somewhat greater to produce 200 proof alcohol, the estimated costs do not exceed the current average price of ethanol which is selling at $1.55 per gallon. As seen in the state of Iowa, a 200% increase in unleaded gas sales as gasohol between June, 1978 and September, 1978 established that there is a market. During February, 1979, over 5 million gallons were sold within the state

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and it is anticipated that 10 million gallons will be sold during July.

Gasohol, which increases the available supplies of unleaded gasoline by 10 percent, will not only offset the current gasoline shortage but extend petroleum reserves, improve the U.S. balance of payments and reduce dependence on unstable foreign supplies. The distillers, in conjunction with the development of small alcohol producing facilities by farmers and their cooperatives under the Rural Initiative Program, will ameliorate the current shortage of premium unleaded gasoline.

In order to allow Schenley and other major distillers the opportunity to utilize their idle capacity for the production of ethanol for gasohol, the reliability of an adequate natural gas supply is essential. Currently most distillers receive natural gas on an interruptible basis so that they are the first to be curtailed when the supplying pipeline experiences a shortfall in the supplies necessary to meet its contractural commitments. Most of the distilleries have dual fuel capability so that they are able to use fuel oil; however, in order to produce gasohol economically, it is mandatory to utilize natural gas. Despite the need for gasohol, the distillers have been unable to obtain an assurance from the Administrators of our national energy policy that a reliable source of natural gas will be available.

DOE is presently encouraging companies to use natural gas to offset the current shortage of crude oil; however, other regulatory agencies responsible for implementing DOE's policies are reluctant to follow such policies. Examples are the Economic

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Regulatory Administration (ERA) and the Federal Energy Regulatory Commission (FERC), which are currently conducting rulemakings which would establish a policy allowing companies to reduce oil consumption by using natural gas. ERA wants companies to switch from fuel oil to natural gas to utilize the natural gas supplies available from the temporary "glut" resulting from the enactment of the Natural Gas Policy Act of 1978. Although ERA initiated and strongly supports this policy, the Chairman of the FERC, the agency which must implement the policy, is less than enthusiastic.

There are other conflicts existing between Federal agencies. In implementing Section 401 of the Natural Gas Policy Act of 1978, Secretary of Agriculture Bergland concluded that distilleries were "essential agricultural users" and therefore entitled to an assured supply of natural gas to meet their current requirements. Nevertheless, last week the FERC issued a notice of proposed rulemaking in Docket No. RM79-40, which indicates that distillers may not receive supplies of natural gas but will have to continue to rely upon fuel oil.

With the advent of the Environmental Policy Act of 1969 and implementing regulations, the distilling industry made a substantial capital investment and converted its coal furnaces to furnaces consuming oil and natural gas. Distillers are now looking at coal and renewable energy sources for the fermentation process. We are all aware of the capital investment and time necessary to implement new alternate fuel technology as well as future uncertainty that more stringent environmental regulations may be imposed. Natural gas should be made available to produce gasohol during this interim

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period. Recently, Consolidated Edison of New York was allowed to use natural gas rather than available fuel oil for the generation of electricity. This practice should be extended to distilleries for the production of gasohol to maintain regional gas supplies.

In summary, Schenley has been investigating the production of ethanol for gasohol for some time; however, we have been foreclosed from considering its production due to the uncertainty of natural gas supplies and financial incentives. Gasohol is an important means of extending the nation's petroleum reserves. Schenley's expertise can easily be applied to the manufacture of ethanol for gasohol. Not only do we want the opportunity to apply this expertise for production at our facilities, but we are willing to assist the agricultural community in its efforts. There is a need for all of us to investigate the potential which Gasohol offers.

Thank you Mr. Chairman for asking me to appear before the Subcommittees.

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Mr. ROSE. Thank you very much for an excellent statement. Are there any questions?

Mr. Bedell?

Mr. BEDELL. Let me thank the witness for the suggestion. It is sensible to try to improve and correct the alcohol production facilities we may have that are sitting idle and also build new ones. I thank you for that comment. I think it makes good sense.

Mr. ROSE. Thank you. Mr. Fithian.

Mr. FITHIAN. I take it Mr. Bedell would accept an amendment I was going to offer.

Mr. BEDELL. I would be happy to.

Mr. FITHIAN. How long would it take for the average plant such as the Schenley plant that you refer to be retrofitted? You talked about 6 months.

Ms. DRENNAN. We foresee that would be a reasonable period in which to retrofit. This depends on the amount of pressure we could exert on our suppliers. Perhaps we could shorten that time frame.

Mr. BEDELL. Could you retrofit to coal-fired boilers as well?

Ms. DRENNAN. That is something we are interested in considering. As I stated before, the distillery industry historically was on coal since the early 1900's until 1969. Schenley is looking into this.

As you are aware, and has been stated earlier today, the environmental regulations come out at various times during the year and the capital investment is substantial. We are evaluating what we should do with our existing plants. We were going to consider coal in conjunction with renewable energy resources. We want to see which one is more economically feasible.

Mr. FITHIAN. One other question. Do you happen to know how many such plants are idle around the country?

Ms. DRENNAN. What I am talking about is excess capacity within the Schenley operation. I am really not privy to the others.

Mr. FITHIAN. What is the total excess capacity within the Schenley operation?

Ms. DRENNAN. Given the optimum viewpoint, as I stated earlier, we could produce ethanol that would increase the current production by 50 percent. This would be 10 million gallons of ethanol.

When I referred to the 20 million gallons, that was what was cited by Mr. Alm earlier this morning as current production.

Mr. FITHIAN. I was wondering about plants. Do you have a dozen plants standing idle, or one, or what?

Ms. DRENNAN. I will be more specific. We have one located at Lawrenceburg, Ind. We have two in Kentucky. We have one in Frankfort and one in Louisville.

Mr. FITHIAN. So you have five plants that are idle?

Ms. DRENNAN. Three. One in Lawrenceburg, one in Frankfort, and one in Louisville.

With those three plants we would be able to increase the current ethanol production by 50 percent. However, I would like to take this opportunity to stress that in order to do so we would have to have an insurance that we would be able to receive natural gas for a limited term. I feel this is consistent with DOE's policy.

Mr. FITHIAN. I suspect if we ever got on line with production that something producing gasoline substitute or additive or extender would rank pretty high.

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Ms. DRENNAN. What is that?

Mr. FITHIAN. I think it would rank pretty high. Its claim on natural gas supply would rank pretty high.

Ms. DRENNAN. There is a conflict because distillers have generally been on an interruptable supply.

Mr. FITHIAN. I am trying to explain the politics of it. The votes on behalf of getting more gasoline are so much greater than the votes on behalf of getting Schenley's whisky, with no derogation intended, that I think it would be easier if we were in the process of getting it for gasohol.

Thank you, Mr. Chairman.

Mr. ROSE. I want to thank all of you very much. We appreciate your testimony.

Our next witness is Mike Hayenga, executive vice president of the National Corn Growers Association from Des Moines, Iowa.

Mr. Hayenga, you may proceed as you see fit.

STATEMENT OF MELVIN K. HAYENGA, EXECUTIVE VICE PRESIDENT, NATIONAL CORN GROWERS ASSOCIATION, DES MOINES, IOWA

Mr. HAYENGA. Thank you, Mr. Chairman.

My name is Melvin K. Hayenga, executive vice president of the National Corn Growers Association.

We appreciate the opportunity to appear before these committees and express our views on this legislation; namely, the Bedell "National Fuel Alcohol and Farm Commodities Production Act of 1979."

We as a commodity organization are in support of this type of legislation. We need to be exploring other avenues of energy sources other than fossil fuel as we are now using. The use of corn is one example of a renewable source of energy which is produced very effectively here in the States.

We note shortages of fuel appearing on the horizon from time to time. I look back to the 1973–74 oil embargo. And most recent, we can look to the Iranian shutdown of oil production. We note the gasoline shortage appearing on the scene. If we want to help extend our supply of gasoline for uses by the consumer, this bill will help achieve this goal. The 9-to-1 ration which is used at present in the gasohol mixture means we can have an additional 10 percent supply of product be used.

The increased volume is not the only benefit we derive. The cleaner burning fuel is important to our environment. We find the 9-to-1 mixture cleaner burning than the straight gasoline we now use. The increased use of our own renewable source of energy will make us less dependent on foreign sources of energy.

The use of our own renewable source of energy will help the balance of trade. This will lead to less importing of energy. The end result is that the dollar will again become stable in the marketplace and our deficit in trade will be lessened thus helping us to strengthen our economy and slow down our inflationary spiral. This spiral increases each time the OPEC countries increase our cost of purchasing energy.

We realize that this is not the final solution to all of our energy problems, but it is a step in the right direction. We need to start to

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solve our problems of energy. Brazil has taken steps to do this. A recent National Corn Growers Association tour found Brazil taking steps toward using renewable energy. The gasohol mixture in Brazil is presently 30–70 with a goal of 100 percent renewable energy for engine fuel. The date to accomplish this is in the 1980's.

The American farmer has in the past and will in the future stand ready, willing, and able to produce a supply of renewable energy product for the American consumer.

Thank you.

Mr. ROSE. Thank you. Mr. Heffernan.

Mr. HEFFERNAN. Thank you, Mr. Chairman. Mr. King, who was originally going to testify as a producer in Iowa, is unable to attend because of the climate conditions we have had.

Mr. ROSE. Thank you, Mr. Heffernan.

You may proceed.

STATEMENT OF KEITH HEFFERNAN, EXECUTIVE DIRECTOR, IOWA CORN GROWERS ASSOCIATION

Mr. HEFFERNAN. I am Keith Heffernan, executive director of the Iowa Corn Growers Association.

We appreciate this opportunity to comment on the National Fuel Alcohol and Farm Commodity Production Act of 1979. Our members who are individual corn producers in one of the major corn-producing States feel there is a great deal of potential in alcohol fuels. Iowa has probably the most active alcohol fuels program in the Nation with over 500 stations marketing the 10 percent ethanol, 90 percent unleaded gasoline or gasohol product. Interestingly, though, it is not just Iowa farmers that are enthused by gasohol. A research project sponsored by the Iowa Development Commission, a State government agency, discovered that over 60 percent of those using gasohol were not farmers and that the response indicated that consumers outranked farmers as benefactors of gasohol. Also, this research indicated that 74 percent of those interviewed felt gasohol use would become widespread to extend energy supplies and to increase engine performance.

I could continue relating information on the consumer acceptance of gasohol, but I would like to deal with three specific areas relating to H.R. 2153.

First, the USDA has suggested that our supplies of corn may not be adequate to utilize a portion of our crop for energy production. Indeed, it is hard to convince the Iowa farmer as he sits with his bins full of corn and until recently a market price less than his cost of production that we should not create more demand for corn.

We feel two factors are overlooked in such predications. First, there will be a lag time of approximately 2 years before the first alcohol production plants could be built to take advantage of the grain set-aside provisions of H.R. 2153. This would give us a considerable cushion in a year of a short crop.

Second, the 18 pounds of Distillers Dried Grain that is created for every bushel of corn utilized in alcohol production has been considered a problem rather than as a partial solution.

Perhaps when we really get serious about gasohol production and apply Yankee ingenuity, livestock producers will utilize Distillers Dried Grain and corn stalks or corn cobs in their rations. Thus,

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whereas the USDA suggested that alcohol production must come from biomass—corn stalks, fodder, and cobs—that are bulky and hard to transport, we feel that there are possibilities to utilize these byproducts on the farm in livestock rations and use corn for gasohol and exports.

Also, there is concern that the private sector, both agriculture and industry, will not make the necessary investments in gasohol production because of the large investments required and the risk as to whether alcohol fuels will be a reality. Indeed, we would suggest that the procrastination on the part of government may be partially responsible for such hesitation.

For example, in Iowa we have an 8½-cent gas tax credit. The State department of transportation is now stating that such a credit will deplete the road use fund. Thus, with such uncertainty and the present economics of alcohol production, few private companies will invest in alcohol production. If we really feel that we need alternative energy supplies and renewable energy sources, we then need to implement programs that give the green light to alcohol production like H.R. 2153.

Lastly, farmers like the general concept of the National Fuel Alcohol and Farm Commodity Production Act of 1979. We like and are geared to produce to capacity rather than idle acres. In addition, we are as hard hit with the energy situation as probably any other sector, and we want to aid in that problem.

Certainly extending our gasoline supplies by 10 percent is not the complete answer but it is a starting point. With the answers and new technologies about gasohol we have discovered in less than a year in our program in Iowa, we are optimistic as to the future of gasohol. However, it will take some incentives, and we believe that H.R. 2153 will provide such motivation.

Thank you.

Mr. ROSE. Thank you. Mr. Bedell.

Mr. BEDELL. Let me welcome Mr. Heffernan here. I think Iowa has been in the forefront in promoting gasohol distribution. We appreciate the work that the Iowa Corn Growers and the National Corn Growers have done. All we have to use is a little ingenuity and we can indeed take the byproduct that we have from this alcohol production and not be faced with a feedgrains shortage as the Department of Agriculture suggested.

Mr. ROSE. I want to thank you very much.

We will now call Don Patterson. He is from the American Agriculture Movement, The Plains, Va.

Mr. Patterson, you may proceed.

STATEMENT OF DON PATTERSON, AMERICAN AGRICULTURE MOVEMENT OF VIRGINIA, THE PLAINS, VA.

Mr. PATTERSON. Thank you, Mr. Chairman, and members of the subcommittees.

Coming before you today, Mr. Chairman, and given the reception of the establishment last winter for our movement, and the place that we sit in the spectrum of agricultural politics, I feel something like Wayne Morse when he said "I will come and I will campaign for you, or against you, whichever will do the most good."

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As you know, the American Agriculture Movement last year pursued a policy of reduced planting to try to influence agricultural commodity prices.

We surveyed the results of that policy after last winter's effort, and we decided as a movement in September 1978 at Sheboygan, Mich. that we would like to get behind a positive alternative to reduce the planting that would be of benefit to the entire country.

We took at that time a step of endorsing gasohol, that is alcohol fuel, as a means of helping to manage the agricultural surpluses.

Thereafter our people have gotten very active in pursuing the ideas and looking at the technologies. We have become convinced that the economies of scale in alcohol production are very much different than they are in other energy technologies and that small scale can be as valuable as large scale and as efficient. In many cases it can be more efficient, particularly when it comes to feeding the wet mash instead of having to spend energy and to have the energy resources to dry that mash.

We very much disagree, as a result of our research, with the information given to the Science and Technology Committee by the U.S. Department of Agriculture, the Secretary of Agriculture, and by Dr. Weldon Barton. We feel that if we did believe the information given by the Secretary in that testimony that we would not be interested in alcohol development at all.

We wish that it would be possible for these agencies to pursue truth somewhat more efficiently instead of balancing interests in the position that they take.

The administration has been, as many administrations are, quite frustrating in wanting to take positions that balance between interests instead of pursuing the course for the good of the Nation.

I hope we can find some way to get at this and to get the exposure for this issue so that we really do get at the truth and we get at the best policy for the benefit of the American people.

The oil companies also in this regard are very frustrated. The information I was reading today showed the kinds of statements that are passed out by the oil firms in relation to alcohol fuels. The imcompleteness and the inaccuracy of this information over and over again is passed off as if it were the truth.

It seems to me that there ought to be some kind of a restraint on people's ability to do these kinds of things.

It seems that it is given as if they were experts who know, and they cannot possibly believe many of the things that they have been putting into print because the facts have been out. They have to have been exposed to more of the information than they seem to have been.

The prime concerns of the AAM are to improve farm income and make the American agricultural economy healthy again.

In view of that, we are not interested in the development fuels if it means utilizing underpriced grain and if it is simply a means of utilizing surplus commodities so that it can provide a tax break for people who already have a substantial cash flow from nonfarm income and are looking for those kinds of benefits.

We want to see something that will rebuild our economy. We face a very serious problem in relation to the centralization of the economics in our system. Until we begin toward revitalizing our

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rural areas and our rural communities, we believe that we will not solve our economic problems as a nation. We feel that the job to be done here is to help revitalize through decentralized programs of economic development the economy of our rural areas and small towns. Through that vehicle we would like to revitalize our entire national economy.

We are not interested in developing a system of alcohol production which simply puts in the hands of those who already control energy one more opportunity.

We are interested in using this finally to provide fair income for farmers and to provide assuring of the ownership of productive capacity in this country.

We feel that if we do not do that that we will proceed to further undermine the experiment which our forefathers gave us, and we have spent 200 years in this country building.

It may seem that we are not in as much peril as we in rural America think and sometimes it seems that our perspectives on it are paranoid, but I went on Saturday last, to visit my banker. He informed me that there is no money in my bank available whatsoever for any purposes. To back up and provide credibility to lack of available loan funds in my local bank, he gave me a clipping from the Wall Street Journal which showed that this was the case in many rural lending institutions across the country.

So, we see that we have been pursuing a national agricultural policy which requires farmers to go back every year and borrow against rising land values, and yet the credit availability in our rural areas is drying up. We see the need to implement new productive processes and we are going to have to be able to form capital in order to do that.

But if the supply of capital is drying up, then how are we going to be able to do that unless the Federal Government is willing to step in with an initiative of even larger magnitude than is envisioned in this bill?

So, what do we tell the farmers of America when they see that policy where the Federal Reserve System and other Federal institutions have continued to pursue policies and they continue to expand the money supply and increase expenditure even with the cost-conscious Congress? They see that the increase in interest rates is a system used to control inflation.

These are farmers whose debt burden and whose debt service is a substantial part—or it has to be paid from a substantial mortgage on their gross income. That is what it amounts to.

How do we explain that the system is not being rigged against them? How do we do this, particularly when we are trying to provide an opportunity to promote a system which can bring income back to the farm in some manner when the politics seem to be against giving a fair price for farm commodities and food supplies on the basis that these increases would be inflationary?

I am sure the committees know that these increases would not be inflationary and that 87 percent of the food price increases have occurred after the food left the farm and the remaining 13 percent would have resulted mostly from imported commodity price increases as a result of the decline in the value of the dollar.

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These are the problems which we see. We are troubled for the future of our country, given these problems. The Wall Street clipping noted that there was considerable satisfaction in Federal Reserve banks, and that they had begun to tighten down credit and they would begin to get a handle on inflation.

The availability of funds for large borrowers in the cities has not declined, but our rural economy is being squeezed.

I am considerably concerned because it was a situation not too dissimilar from this that resulted in the crash in 1929 and brought the depression upon us.

I hope that the Congress can examine these things and get to the bottom of them.

Let me conclude with this.

The Atomic Energy Commission provides some value as a model as to what we might do in developing biomass and the other alternative fuels.

It has been a successful experiment. I think it is too bad in many ways that they did not have a better idea to start with, but I have a copy of the 1972 financial report of the Atomic Energy Commission. I note that under the civilian reactor development component that they were spending for a period of 10 years nearly half a billion dollars a year. This is not loans and loan guarantees. This is Federal expenditures to develop an industry and to do the research to develop an industry.

I would like to submit that we could do a great deal in the development of biomass energy if we had that kind of backing available.

Thank you, Mr. Chairman.

Mr. ROSE. We want to thank you.

Without objection, we will insert your entire prepared statement in the record.

[The prepared statement of Mr. Patterson follows:]

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ALTERNATIVE FUELS PRODUCED FROM AGRICULTURAL MATERIALS AND OTHER BIOMASS

Testimony by Don Patterson, American Agriculture Movement, before three subcommittees of the House Agriculture Committee, 16 May 1979

During the winter of 1978, farmers in the American Agriculture Movement joined together in pursuing a policy of reduced planting with the goal of obtaining a better price for farm commodities through a reduction in supply. At the time, we understood the difficulty of making such a policy work without an act of Congress backing up the program. Failing as we did to obtain the kind of legislation that we feel is necessary to protect family farm income in America, we reflected on the results of the 1978 effort and sought to develop policies which would be capable of assuring the future economic viability of family farming, not just for the benefit of farmers, but for the benefit of all Americans. We believe that the protection of family farms is important to the economic and political health and stability of our American way of life.

In September of 1978, after gathering and reviewing a great deal of information about alcohol and other hydrocarbon fuel plants utilizing agricultural commodities and agricultural wastes as feedstock, the national delegate body of the AAM adopted a policy of strong support for the use of agricultural surpluses and set-aside land for the production of alternative fuels. The delegates noted at the time that substantial quantities of agricultural

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commodities could be used for fuel purposes without jeopardizing the food supply, inasmuch as the byproduct of alcohol plants is a high nutrient, high protein mash which can be valuable for both animal and human consumption. Instead of reducing the food supply and contributing to hunger in the world, we find that the production of farm fuel can actually improve our ability to meet the challenge of world hunger. While hunger is substantially a purchasing power problem, it is also related to international productive capacity and the need to increase the level of protein availability and consumption.

Since the AAM delegate body passed its resolution supporting the development of alcohol fuel, interest in the development of production capability has grown markedly among farmers involved in the Movement. We have looked at a variety of technologies, large scale and small, and while there is a great deal to be done to research, develop and demonstrate the ideas we have been exploring, we have seen enough already to believe that efficient production of alcohol fuels by small and moderate sized farm and community scale plants is definitely possible. We feel that the national and international benefits resulting from the launching of such a program can be substantial.

In this regard, it may be helpful for the committee to know that our findings are not in accord with the information presented by the Secretary of Agriculture and Dr. Weldon Barton of the USDA in their appearance before the Science and Technology Committee last Friday, May 11. If we believed the information presented by the Secretary at that time, we would not be interested in alcohol fuel production at all.

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As you are aware, the prime concern of the AAM is to achieve a fair price for agricultural commodities and a fair return on farm investment, labor and management. Because our primary motive is to preserve American family farms and a sound agricultural economy within which farming and not land speculation is the primary basis of earned income, we are not interested in programs which simply utilize agricultural commodities without providing farmers with a fair return on their efforts. We are certainly not interested in setting up a program which simply provides a tax deduction for those seeking ways to write off losses against non-farm income. The program has to make economic sense at grain prices which yield a fair farm income from our point of view. We oppose incentives for an alcohol production program which is feasible only through the utilization of underpriced grain. We want to help solve the energy problem, and we believe that we can do that while utilizing commodities at fair prices, manufacturing valuable byproducts and helping to improve depressed income conditions on America's family farms at the same time.

While useful work still can be done in relation to economies at scale and net energy efficiency in alcohol production, we believe we have learned enough already to justify the conclusion that small and moderately sized plants can be as efficient, and in many cases more efficient, than large scale plants. For example, by feeding the mash wet on the farm, the expense and energy necessary for drying can be avoided. If continuing research justifies our conclusions, we will oppose the tendency exhibited in Secretary Bergland's testimony and also in H.R. 3905 to favor and promote the development mostly of large scale plants.

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Aspects of H.R. 3905 appear biased in favor of operation and control of alcohol production by large operators and by those industrial firms which enjoy better-than-average ability to form the necessary capital. We are not interested in supporting the development of a new industry for the benefit of those who already have family farmers over a barrel by virtue of their superior market leverage and oligopoly organization. We want to pursue policies which are the most wise for the long-run health of our national economy. We believe the wisest course is to use the alcohol fuel production opportunities to re-establish important balances in our economy, not to add further lop-sided imbalances.

The AAM wants to see the production of alcohol fuel maintained as close to the source of basic feedstock resources as is possible, either on the farms or in the small rural communities of America where participation in the ownership and operation can be broadly shared as a means of restoring economic health and viability to rural America. We feel that important steps can be taken now to revitalize our rural economy. The productive decentralization of our economic system, through the revitalization of rural America, is essential to the restoration of broad national economic health. We are interested in enhancing the potential for earned income in rural America as an antidote to present policies which are increasing farm debt and farm dependency on those who seek to advance their own special interests through increased ownership and control of land and other production assets.

For the sake of our national economic health, it is time for this country to

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pursue decentralized energy technologies and to study carefully the social and economic economies of scale as well as the economic externalities which go into figuring the wisdom of our energy development choices. For too long, we have accepted biased numbers from firms in the energy industry purporting to defend economies of scale. Too often, accepted figures fail to take into consideration important direct costs not to mention indirect and external costs. We have bought, for example, such enormously costly propositions as the trans-Alaska pipeline only to learn now that Californians must wait in lines at the gas pumps while Alaskan crude oil flows through refineries in Japan.

In the 1930's, Australia made a choice in favor of on-farm solar and wind energy systems even though the technologies available at that time were quite modest. In establishing this policy, Australians took a giant step to improve the independence and self-sufficiency of their rural citizens. During the same time period, this country opted for centralized rural electrification only to learn now, nearly 50 years later, that the rural electric cooperatives are as much a part of the problem of rapidly inflating energy costs as privately owned utility companies.

This brings us directly to the question of subsidies for alcohol production. If the subsidies which have been extended to the electric generating industry could be offered to alcohol producers, I believe that we could rapidly and successfully make gasohol and other biomass fuel available nationwide. The Atomic Energy Commission provides us with a successful model of how such a program might be handled. Perhaps this suggestion will sound outrageous to some. If it does, it may be only because of the lurking myth that only big business has the

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capability of making fruitful use of such subsidies. Those who feel this way might be the same people who believe that vertically integrated agribusiness giants are more capable of efficiently producing food than America's family farmers.

H.R. 3905 sets up a system for subsidizing the building of alcohol fuel plants and the provision of subsidized grain as feedstock for these plants. Without wanting to be critical of the authors of this legislation whose support we greatly appreciate, this system reminds me of the bakers of white bread who, for the sake of shelf life and spoilage, have removed all the wheat germ, bran and essential nutrients which are native to kernel wheat, creating a spongy anomaly out of only the white part of the flour. After reintroducing some synthetic vitamins to help with the promotional effort, this product is then marketed as "enriched bread." Just because this material is made from wheat and not from wood pulp, you can't convince me that it is not simply a softer, thicker form of kleenex.

While the authors and sponsors of H.R. 3905 have no doubt done the best they can do under the prevailing political circumstances, the subsidy program embodied in the bill seems to me roughly similar. We believe that federal farm policy has served to choke America's agricultural economy, transferring fair farm income from the producers of the nation's food and fiber over to other sectors through the vehicle of depressed federal commodity loan rates. In this context, you will no doubt understand our bitterness and outrage when we see ourselves being

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offered some legal intricacies adding up to a subsidy for the promotion of alcohol fuel production.

Certainly, you can understand our agitation when responsibility for the program management, the utilization of crops and the determination of the technologies to be rewarded is turned over to the very same Secretary of Agriculture who has called our farmers greedy and has stonewalled their efforts to gain fair recognition at every turn. We realize that no other reasonable alternative may exist, but at the same time, we are much less than enthusiastic about giving such a Secretary further responsibilities for alcohol fuel development, when he has not yet even implemented the alcohol fuel provisions in Title II of the Emergency Agricultural Act of 1978. These authoritizations, after all, do enable the Secretary to accomplish some of the goals of H.R. 3905 without need of further expression of intention by the Congress. Certainly, the members of these sub-committees can be no more content than we are to give discretionary authority to the representatives of an administration which has repeatedly favored policies designed to keep family farming under continuing economic pressure, further serving to concentrate the ownership and control of farmland. For years, the USDA has pursued policies which have said in no uncertain terms to the family farmers of America: "get big or get lost." If these policies served the best long-run interest of the country, that would be different. But when they are contrary to the national interest and promote the wrong developments within our economic system---when these policies artificially enlarge farms and aggregate farmland ownership into unit sizes larger than can be most

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efficient in the production of food, they must be questioned.

If the Congress and this Administration would give a fair return to agriculture for its investment, its labor, and its management, I believe you would find that we would be in a strong position to form the capital and address energy and food production goals simultaneously. In addition, we would have the income to properly meet our soil conversation responsibilities as well.

In relation to our ability to finance alcohol fuel plants at the present time, it may be of interest for me to tell of a visit I made to my banker last week. I was informed that my bank has no money to lend whatsoever, for any purpose. To back-up and make credible for me this news, my banker gave me a copy of a Wall Street Journal clipping dated April 4, 1979. This clipping reports Federal Reserve Bank's satisfaction with the fact that present monetary policy has resulted in the virtual unavailability of loan funds in rural banks. The article notes that this does not mean that funds are not available in larger cities for big borrowers. The article transmits a feeling of jubilation on the part of central banking officials that the rural economy has been successfully straightjacketed. The national inflation problem would soon be beaten, they seemed almost to rave.

Jubilation was hardly my own reaction as I perceived the implications of this policy for farmers and for rural America. The depression of the 30's was triggered under similar circumstances. Could this be what the bankers have in store for us again in the name of fighting inflation? Hopefully not, but even if not, this approach will certainly make it much more difficult for us to find the resources to set up alcohol fuel plants unless the lack of available local funds

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is somehow made up for through even larger federal initiatives than are embodied in H.R. 3905.

Perhaps it is simply paranoia, but it becomes hard to explain the virtue of achieving success in the national fight against inflation when America's farmers are going to have to hang by their thumbs to achieve it. What can the members of Congress tell a farmer when they see the Federal Reserve System and other federal institutions pursuing policies which continue to cause inflation through increases in the money supply and federal spending, and at the same time, attempt to manage the inflation by raising interest rates? How can you explain the virtue of this approach to farmers when federal policy has been managed so as to require that they go back year after year to borrow more money in order to stay in business? How do you interpret this policy to farmers who pay a large part of their gross income to cover debt service? How do you suggest we make the farmers of America believe that the system is not rigged against them?

Agriculture has suffered continuously because of its inability to stay organized to fight off the power held over it by other economic sectors. Should we continue as we are, it may not take much longer for our heritage to crumble. Few want to believe that our economic and political system is in a perilous state, but if it is not, certainly some way can be found to explain the situation down home on the farm.

If there was ever a sector of our economy which deserved to be indexed to preserve the health and balance within our total national economy, that sector is agriculture ---the major sector made up of many competitive units that is almost completely

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incapable of amassing the market control and therefore the assured profitability which seems somehow to translate into political power.

The American family farmer is truly the goose that lays the golden egg, but even the golden goose has its limits: it can be choked for only so long before the golden eggs are laid no more.

The proposed legislation offers a six hundred million dollar program of loan guarantees. Perhaps it would be valuable, in closing, to set the issue into perspective, by concluding with some information on the extent of the subsidy provided to the nuclear industry through the Atomic Energy Commission. I have the 1972 AEC budget here which shows that for civilian reactor development alone, not to speak of a great collection of other support and benefits, the federal government injected, not as loan guarantees but as outright government expenditures, roughly 1/2 billion dollars annually for a decade and this book does not even show the full story. Too bad the federal government did not have a better idea, like biomass fuel, to invest in back then! Just think how different things would be today if even a portion of all that nuclear money had gone to support the development of biomass and other renewable energy systems on a broadly decentralized basis nationwide.

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Mr. ROSE. Mr. Patterson, we appreciate your being here.

I want to thank all of the witnesses for patiently sitting through these 2 days of hearings. This has been indepth information, and we have duly considered the legislation.

We will need to meet again to mark up this bill.

At this point, without objection, we will insert the several statements which have been submitted to the committee for inclusion in the record.

The subcommittees will now adjourn.

[Whereupon at 6:25 p.m., the subcommittees were adjourned.]

[Additional material submitted to the subcommittees follow:]

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Prepared Statement of Hon. Mark Andrews, a Representative in Congress from the State of North Dakota

MR. CHAIRMAN: I am pleased to have the opportunity to testify in support of H.R. 3905, the National Alcohol Fuel and Farm Commodity Production Act of 1979.

For years we have been looking for ways to ease our dependence on foreign oil and a place to sell our grain -- gasohol could be the answer to both problems.

Farmers have been experimenting with gasohol since the 1930's and it is already selling briskly at about 500 filling stations in the Midwest. Gasohol is a wonder that yields about the same mileage as unleaded gasoline and -- more important -- offers an ever renewable source of energy. We can take coal out of a mine, but we can never put it back. We can draw oil from subterranean reservoirs, but we can never refill them. But, we can continue to produce agricultural commodities that can be converted to alcohol.

Gasohol, used to augment gasoline as a standard fuel, could cut perhaps 10 percent from the nation's oil import bill, which last year reached a staggering $40 billion. This would, of course, substantially improve our balance of trade.

Certainly, the energy crunch we are presently experiencing should be reason enough to pass this legislation We have waited far too long to take positive action.

In faraway Brazil, American-owned oil companies are marketing gasohol which they have yet to develop and sell in the United States. Before too long Brazil will have cars rolling off the

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assembly lines specifically manufactured to run on alcohol. There is no excuse for a country as advanced in research as we are to remain so far behind.

Critics of gasohol have continually pointed out its high price. But with gasoline rapidly approaching a dollar a gallon, what once seemed economically impractical has begun to look very attractive. The cost could be reduced by the development of more efficient ways to produce alcohol. At present, the only proven technique is fermentation. But, even with present technology, gasohol offers us a sound alternate source of energy.

The critical thing now is to get more gasohol plants in operation. This bill would go a long ways toward doing just that.

The possibilities of alcohol made from renewal sources are endless. Alcohol can be manufactured from potato culls, sugarbeet waste, cornstalks and, in fact, from almost any vegetable matter capable of fermentation. The waste products of our farms are available for this purpose, and even the garbage from our cities. We must encourage the development of these plants throughout the country and supply the incentive necessary to make these plants successful.

If we want to continue to enjoy the standard of living we have today, we must become more energy self-sufficient. I urge early passage of this legislation as an important step in that direction.

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Prepared Statement of Hon. Thomas A. Luken, a Representative in Congress from the State of Ohio

It is absolutely necessary that we break our dependence on foreign oil. We should do this by strongly supporting the development of alternative fuel sources.

Gasohol is an alternative fuel source which we already know how to produce and which has excellent potential for helping to solve our energy problems. Since we already have the technology to produce gasohol, we should stop dragging our feet and get on with production.

I believe that the period of skepticism surrounding the use of gasohol is ending both as acceptance for the its use grows steadily among government officials, the automobile industry and consumers, and as new facts on the cost and amount of energy used in its production are published.

Within the government, the Treasury Department has been studying changes in its regulations to help the growth of the gasohol industry in both manufacturing and marketing. The Department of Energy has increased its funding for gasohol from 8.7 million in FY 78 to 20 million in FY 80. In addition the Department of Energy recently stated that there are no technical barriers to the production of alcohol fuels.

Recently, both General Motors and Chrysler have extended their warranty coverage to include the use of gasohol in cars and trucks, thereby implicitly acknowledging the viability of alcohol-based fuels as a gasoline substitute.

The consumers in my region of Cincinnati, Ohio have been responding extremely favorably to the first gasohol outlet which has been operating for the last three weeks. The retailer of this outlet plans to open 10 to 12 outlets in the Cincinnati area in the near future with the price of fuel being competitive with petroleum at about 87 cents

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a gallon. I understand that consumer response to gasohol in other areas of the country is equally favorable.

There has been a question of whether or not the production of fuel alcohol required more energy than it yielded. There is conflicting evidence on this point, with the Department of Energy reporting that the economics of gasohol "fluctuate between being favorable and unfavorable." I do not believe that this question should halt our moves toward greater production of gasohol since there is evidence that numerous companies are now offering plant designs that assure generously positive net energy balances.

In addition, when we view the production of gasohol in the context of using other alternative sources of energy such as solar power and recycled thermal heat from power plants in the distillation process, the economics become more favorable. The use of these alternative sources instead of oil or natural gas will further lessen our dependence on foreign petroleum products. The final solution to becoming energy independent will be the development of a combination of of alternative energy sources, with gasohol being one of them.

Another major point in favor of gasohol is the decentralized nature of the industry. Gasohol, by its nature, will promote the growth of small independent firms. Gasohol is not a fuel whose production can be easily centralized and controlled. Farming co-operatives and individuals can easily get into production themselves. Municipalities can set up their own distilleries for methyl alcohol produced from industrial waste. This is a distinct advantage in view of the problems which the U.S. has faced with petroleum being controlled by large companies.

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Through my position as Chairman of the Energy Subcommittee of the Small Business Committee, I am sensitive to the importance of small business to the strength and competitiveness of the American economy. In the development of any new industry, small business has played the critical role in linking new ideas and innovations to the marketplace.

There are some concrete steps which I feel we should take to move from the research stage in the use of alcohol fuels to production. First, we need to do more to increase the number of alcohol production plants through pilot projects and loan grants. This type of encouragement is supported by the Administration. The need to use several types of commodities in the production of gasohol may be the deciding factor in determining the most economical location for a conversion plant. A location which provides easy and economical access to sufficient quantities of several crops is necessary over the long run to counter supply problems.

Secondly, we need to re-examine certain provisions of our franchising laws which are quietly yet effectively blocking the marketing of gasohol. Currently, a franchized dealer may not sell any products other than those of its own franchise. As 82% of the country's retail stations are branded franchise stations, they cannot offer gasohol.

In summary, other countries have realized the importance of alcohol-blended fuels and have moved ahead in their production. Brazil, which is saddled with a trade deficit largely the result

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of oil imports, has made a firm committment to replace 20% of its gasoline with ethanol by 1981. In West Germany, where agricultural land is scarce, the government is considering using methyl alcohol as a basis for a post-petroleum economy. Methyl alcohol, which is made primarily from coal, contains substantially less energy per gallon than grain-based ethanol fuel but can also be an economical source of fuel when high technology processes are used. These are the kind of efforts that the United States can and must make.

In the Spring of 1978, the Department of Energy released a position paper on gasohol fuels, which said that there were no technical barriers to the production of alcohol fuels.

This has been followed up by several legislative measures mandating the use of alcohol fuels. I believe we must seriously consider and take action on these pieces of legislation before the close of this session. Some of them might be too ambitious, others not ambitious enough but one thing is certain - gasohol is a viable alternative energy source that is ready to be harnessed today. We must move ahead, make use of it and thereby, decrease our dependence on foreign oil.

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EIGHTY-SIXTH LEGISLATURE

14 May 1979

STATEMENT FOR THE HOUSE AGRICULTURE SUBCOMMITTEE

Eight years ago, as a State Senator, I introduced the first Gasohol legislation in this country; the state of Nebraska has since that time led the country in the development and the use of Gasohol. Today, Gasohol is sold widely in Nebraska; indeed, demand exceeds supply. During the past eight years, however, little has been accomplished on the Federal level to encourage the development of Gasohol. H.R. 3905 would be a strong step in the proper direction, especially as it would provide Federal loan guarantees to private industry for the construction of alcohol plants.

While I strongly approve of this bill in general, I would make two specific recommendations. First, after the recent decision of the Commodity Credit Corporation to award four loan guarantees to non-agriculturally related projects in direct contravention of legislative intent, I urge that this bill be so clearly written that there be no doubt of the intent that the loan guarantees go only to plants utilizing grain whose products will be used for Gasohol. Secondly, I suggest that the Secretary of Agriculture, in awarding loan guarantees, give preference to those states with a large surplus of grain in the Federal Three Year Reserve Program. This surplus could readily be used for conversion into alcohol fuels for Gasohol use.

In conjunction with legislation like H.R. 3905, the United States would do well to study closely the Brazilian National Alcohol Program. Brazil is attempting, through its alcohol production and its Gasohol programs, to travel quickly down the road towards energy independence. In a country with similar abundant resources of agricultural land, sunshine, and water, the United States could also, if it is willing, travel in the same direction.

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Eight years ago, at the public hearing for my Gasohol bill, the opponents to LB 776 said that the public would not pay an additional 3½¢ for Gasohol, that petroleum supplies were plentiful, that if there were a problem, the Federal Government would take care of it. They argued then, as many still did as recently as a few months ago, that Gasohol was not economically feasible. Today, no informed person can argue that we are not in the midst of a severe energy crisis; a crisis which will only worsen as long as we persist in our dependence on petroleum. The production of grain alcohol as encouraged in H.R. 3905 will, through its use for Gasohol, lessen our dependence on imported oil.

I would like to read for you a short statement taken verbatim from the floor debate on LB 776 in the Nebraska Unicameral on May 14, 1971:

> SENATOR SCHMIT: ... If it is ever going to work, it ought to work now. And I don't think we need to be concerned about the difference in the price of alcohol produced from grain as versus that produced from petroleum because the grain is a renewable resource and petroleum is not. We have been told, and I also have in the pack, information that tells us that the supplies of petroleum are very short. I have been told that the north slope discovery in Alaska, as great as it is, would only supply the needs of this nation for three years if we had to depend totally upon that. As you know, the near East and the Middle East oil supplies have been increased in price tremendously in the last two years; in fact, as recently as the last month or two. While in the case of grain we have an expandable resource and a renewable resource and a resource that is produced within this State. Petroleum is a diminishing resource is a resource which has enjoyed over the years tax breaks--I think you will recognize that. I think it is only feasible and that it is only right and just that we give a tax break to grain alcohol in an attempt to see once and for all if it will work and I am not going to stand here and tell you that it will work. There are persons in this room who have seen it

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> work and may testify to that effect. I am going to say today, with the nation's concern about the pollution problem and the concern about the shortage of fuels, that we should give it a try.

The events of the past years have only intensified my belief in Gasohol. Since 1971, the energy crisis has grown in severity, petroleum has more than quadrupled in price, and our trade deficit has mushroomed in large part due to oil imports. During this time, however, Gasohol has been proven viable as an energy alternative that needs to be acted upon now!

Reading this transcript of a debate eight years ago to the very day that I am preparing this testimony, is frightening. What irony there is in my statement that "oil supplies have been increased in price tremendously in the last two years; in fact, as recently as the last month or two." Spoken in the days when gasoline at the pump cost about 30¢, today those words have a prophetic ring about them.

Today, the future of this country depends on our ability to develop alternative sources of energy. While in the long range there may be more efficient sources of energy developed, at this time alcohol is an alternative whose time is long overdue. Alcohol could serve as an interim source of energy while technology develops better alternatives. I therefore urge the passage of H.R. 3905, a bill which could make it easier for alcohol to be produced on the scale necessary for Gasohol to become a national fuel.

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Prepared Statement of Paul A. Bucha, Land Improvement Contractors of America

I appreciate the invitation to appear before this Joint Public Hearing to testify on behalf of the National Alcohol Fuels and Farm Commodity Protection Act of 1979.

I understand that this hearing has been arranged in an attempt to identify and evaluate the problems and benefits involved in the proposal to use agricultural commodities and other renewable resources to stimulate the alcohol fuel industry.

There are two major points that seem to come up whenever the idea of alcohol as a fuel is mentioned. The first question is the possibility of attaining a positive net energy balance. The other seemingly important question is-- How does alcohol compare with other types of fuel from an economic point of view? I am sure you will have qualified technical experts who can provide you with sufficient data to answer both of these questions. I know because I have also heard facts and figures cited which will support the contention that alcohol is economically feasible and if produced in sufficient quantity, could provide a renewable source of energy which would go a long way towards solving our current gasoline shortage problems.

We are now way beyond the point where we should be considering the tradeoff of alcohol versus petroleum and beyond the point where we should be comparing today's gasoline prices against comparable prices of alcohol. I have seen studies that show the commercial cost of a gallon of alcohol produced from various crops, including corn, milo, wheat, cane molasses, beet molasses, barley and sorghum, and a cost range from a low of 79¢ a gallon to a high of a $1.35 a gallon. However, these costs are rather academic at this point because we are inclined to compare them with the artificially low controlled prices of gasoline at the pump today in a world where OPEC oil prices are around the $15.00 a barrel level. Yet, everyone knows these prices will continue to rise and there have been estimates that by 1985, a $55.00 a barrel world price will be in effect. Thus, how can we continue

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to ignore the possibility of using agricultural crops, which are renewable, to supply some of the energy that we need.

One of the arguments heard quite often against the development of a gasohol productive capacity in this country is that the net energy balance will be negative--that it costs more in terms of energy to produce a gallon of alcohol than the energy that can be expected from that gallon. I believe that a value judgment on the amount of energy required to produce alcohol must await the development of widespread full-scale mass production before anyone can definitely state what the net energy balance potential may be.

John Gibbons, Professor of Physics at the University of Tennessee and a former Director in the Federal Energy Administration, points out how progress from technological developments has reduced the amount of energy required to produce a given amenity. For example: the efficiency of electrical conversion into lighting has increased from less than 5% when we use incandescent light to more than 30% since 1950. Also, the energy required to produce a pound of aluminum has fallen from 12 kilowatt-hours per pound in 1950 to approximately half of that value now. Producing a fire-safe diesel fuel has resulted in a fuel that burns with 10% better economy and 50% less exhaust smoke. It is reasonable to expect that as alcohol is produced in quantity and due to competition in the marketplace, the same economics can be expected. The point to remember is that while it takes one unit of fuel to produce one unit of alcohol, the fuel can be solid coal waste rather than petroleum.

While the United States is spending valuable time in debating the pros and cons of gasohol, other countries have gone ahead with this program and I am sure the gentlemen on this committee are aware of the situation in Brazil and that country's plans to eventually attain a goal of 100% alcohol fuel by the 1980's.

The objectives outlined in H.R. 2153 for using set-aside acreage to produce corn would not only stimulate production of the alcohol needed for gasohol fuels, but

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could reduce the billions of dollars that are spent each year to pay farmers not to grow crops. It should also result in some fringe benefits if the federal bureaucrats now engaged in supervising that federal program were diverted to other duties or laid off.

One other concern has been raised, especially by some environmentalist groups; namely, if farmers are encouraged to expand the acreage devoted to crops, will it increase the danger of pollution, further erosion of our top soil and depletion of our productive agricultural facilities? I think that if the American farmer is encouraged to produce crops which he can sell at a profit, he will also have the means to protect the farmland and he may be able to install conservation practices on his land without government cost-sharing. It is only when the prices he can get for his crops are below his cost of production that he is unable to do so.

I think the bill introduced by Congressman Bedell is modest in the financial outlays that are proposed, but it would at least provide a start for a much needed new energy program in this country. I don't believe that the solution to our energy problem is achieved by all the talk of cutting back, closing down and conservation--even though these do offer partial relief. When we were faced with the total loss of natural rubber from the Far East during World War II, we rapidly developed synthetic rubber. If we had confined our efforts to conservation and less use of rubber, it would have been disastrous--however, that seems to be the prevailing philosophy within the Administration today.

The development of alcohol as a fuel would stimulate thousands of small, as well as large, alcohol-producing plants. It would serve to break the monopoly of the large oil companies as the principle source of fuel and it has so many other benefits in terms of improving our balance of payments that we should proceed without delay.

As a final thought, I conclude this testimony, and speaking as an ordinary citizen--I am rather tired of being told that we do not appreciate the need for conservation

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of our energy resources and the necessity to form car pools, use public transportation, keep thermostats down and on and on and on. I don't think that the Congress has added to the credibility of these accusations by some of your own actions. May I ask why is it that you approve the present arrangement for authorizing television blackout of sporting events, such as college and pro football games, basketball games and baseball games, unless tha home stadium is sold out? Doesn't that encourage unnecessary transportation to witness athletic contests which could be seen more comfortably over the home television station? Do you realize how many gallons of gasoline are wasted driving to and from these sporting events? And while members of this committee were not involved directly in these decisions, as members of Congress, you were!

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Prepared Statement of Lewis B. Collins, Camilla, Ga.

About eighteen months ago I became very interested in alcohol derived from farm products as a supplamentary fuel. The possibility of developing a national alcohol fuels program seems to offer a tremendous opportunity to solve two of our country's major economic problems: (1) maintaining a stable and prosperous farm economy, and (2) reducing our crushing dependence on foreign oil.

I have availed myself of all the information I could find on alcohol fuel, and have become convinced that a national program not only will be viable, but is critically essential at this point. Being a lifelong farmer, I am aware, also, of the farmers' economic dilemma and see in the alcohol program a means to increase farm income and alleviate the fuel crunch that will inevitably worsen.

Congressman Berkley Bedell has introduced a bill in the House of Representatives which addresses itself to two immediate concerns: developing alternative sources of energy, and creating new markets for farm products. H. R. 3905 will be the catalyst needed to stimulate a national gasohol program.

Instead of continuing to debate whether to use farm products in alcohol production, we should simply proceed, with confidence and delibera speed, always conscious of the need to conserve energy in its production.

Much of the opposition to the use of alcohol has concentrated on its purported negative energy contribution. This opposition is usually stated in the terms, "The process wastes energy," and "It takes more energy to produce it than it returns." These statements are misleading

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and, in specific cases, totally erroneous. Evaluation of the net energy balance of alcohol or gasohol requires consideration of many interrelated factors.

So when we find the BTU value of alcohol to be 165,800, in a blend as compared to gasoline, we then consider the fact of using the renewable source of fuel for processing the alcohol. We consider the 46,000 BTU required to produce the corn for one gallon of alcohol and the DDGS which has a dollar value equal to one-half the original cost of grain. Then we need to charge to the energy cost of producing the alcohol only 23,000 BTU.

Now - it takes about 63,000 BTU to completely dry the DDGS. By utilizing the small farm size plants (and thousands of these could be built), we can use the grain residue in a semi-dry state and need only about 32,000 BTU. We are using the waste product renewable fuels for processing the alcohol.

So the total equivalent of the BTU in fossil fuel we have used is 55,000. Remember how we had put a BTU value of alcohol at 165,500, that leaves a net gain of 110,500 BTU per gallon.

Another example of the interrelation of many factors is the fact that agricultural residues which are current regarded as "waste" (e.g. peanut hulls, wood bark and sawdust, field residues, etc.) can be used to fuel the fermentation process, distillation process, or both. Since much of this energy is not presently being utilized elsewhere, it becomes a net reduction in fossil fuel requirements for alcohol production.

Should these "wastes" be used to fuel a plant, it is only economically

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attractive to use wastes from a small area, say within 100 miles of the plant. Thus the simple requirement for economic feasibility will lead directly to the use of small, local plant operations to avoid high transportation costs.

When alcohol is blended with gasoline, other benefits accrue. Based on data from the Nebraska Two Million Mile Road Test, it has been shown that a blend of one gallon of alcohol with nine gallons of unleaded gasoline (known by its trademarked name - Gasohol) displays a positive volume change of mixing equivalent to .23%, increases miles per gallon by three percent, and raises octane number by at least three points. Using these figures, ten gallons of gasohol will move a car as many miles as 10.324 gallons of unleaded gasoline.

The upshot of this discussion is that the addition of the alcohol improves the energy available from the gasoline. That is, the whole is greater than the sum of the parts.

These are some of the major points of controversy regarding the net energy of alcohol. An adequately comprehensive examination of these interrelated factors clearly shows the positive energy benefit accruing from the production and use of gasohol.

For example we have about 80,000 BTU in a gallon of alcohol and 125,000 BTU in a gallon of gas.

Consider: ten gallons of gasoline at 125,000 BTU/gallon yield 1,250,000 BTU. If we assume ten miles per gallon then this gasoline will carry us 100 miles. Now consider the gasohol case: 9 gallon of

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gasoline at 125,000 BTU/gallon yield 1,125,000 BTU. But the gallon of alcohol added increases miles per gallon and volume as discussed earlier. That is, the actual miles traveled with (9 gallons of gasoline plus one gallon alcohol) is 103.24 by using previously discussed figures. Thus the gasohol has replaced the equivalent of 1,290,500 BTU of gasoline (1.0324 X 1,250,000). Subtracting the BTU value of the 9 gallons of gasoline we find (1,290,500 - 1,125,000) a "real" value of 165,500 BTU for the alcohol. That is, the single gallon of ethanol mixed with the gasoline has really replaced 165,500 BTU of gasoline.

This positive energy contribution of alcohol has been stated by Dr. William A. Scheller in Publication 68588, University of Nebraska-Lincoln, in terms of gallons of oil saved. In this paper, presented at the U. S. Department of Energy Hearing on Gasohol, April 6, 1978, Scheller states: "When one gallon of grain alcohol is used to replace unleaded gasoline in the gasoline production case there is a saving of 1.016 gallons of crude oil. In the Gasohol case the nine gallons of unleaded gasoline may have lower octane number than the unleaded fuel in the gasoline case. This is because the alcohol will increase the octane number of the Gasohol blen raising it to the same octane as that in the gasoline case. This lower octane number results in a savings 0.286 gallons of crude oil per gallon of grain alcohol blended. Finally the ability of Gasohol to take the vehicle three percent further on a given amount of fuel results in a saving of 0.299 gallons of crude oil. These three savings sum to a crude oil saving of 1.601 gallons per gallon of alcohol used in producing Gasohol."

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Some critics of a national gasohol program cite the uncertainty as to the ability of the American farmer to produce sufficient commodities to support the program. Perhaps the best answer to that is in the words of Dr. Harold Gurley, Extension Agronomist, University of Georgia: "My experience with the American farmer has been that if you offer him a little profit to grow a crop, and ask him to grow all he can, you had best move back out of his way or he will cover you up."

This was Dr. Gurley's comment as we discussed the ability of the southern farmer to increase his production, if given an opportunity, in order to assure the viability of a national gasohol program.

Based on his past research, Dr. Gurley today advocates "double-cropping", such as growing a crop of grain sorghum behind a crop of corn on the same land in the same year, to increase farm income. The one thing that concerns him was the possible interference with the planting of the second crop by the residue (stalks, fodder, and shucks) left on the ground behind the corn crop. However, this problem is eliminated by an attachment on the rear of the combine to distribute the stalks and harvesting litter in windrows behind the combine. This has already been introduced by Lilliston Corporation, Albany, Georgia, with their peanut combines, and it is simply a matter of time before it will be adapted to corn combines.

A farmer can in this manner, with a no-till operation, plant grain sorghum within five minutes after the corn crop is harvested, thereby saving fuel, manpower, fertilizer, and cost. It has been proved that very little fertilizer is needed for grain sorghum planted behind a

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highly fertilized corn crop because of the residual amount in the soil after the corn crop has been gathered. Also if the land is left fallow until the next year, most of that residual fertilizer has leacked out.

With typical ingenuity, the southern farmer, with the advantage of a long growing season would readily accept the two crops per year idea as a means of reducing costs and increasing income. Full scale, this will create across the southern part of the United States the potential of double cropping at least 10,000,000 acres of land and increasing grain production by about one billion bushels, all without adding a single acre of cropland to those already under cultivation!

With the set aside program abolished, and those additional acreages returned to production, any uncertainty as to the productive capacity of the American farmer should be completely laid to rest.

Congressman Bedell has indicated his intention to expand this legislation to include additional commodities and there are many that could be used. One important farm crop which should be included as a feedstock for alcohol fuel is the sweet potato. With almost fifty percent more carbohydrate content that the irish potato, the sweet potato shows considerable promise as a source of ethyl alcohhol.

Preliminary laboratory tests by Domestic Technology Institute, Denver, Colorado, indicate the potential of the sweet potato to be possibly fifty gallons of alcohol per ton.

Dr. Silas Harmon, Horticulturist, Georgia Coastal Plain Experiment Station, Tifton, Georgia, has experimented with a propagated sweet potatoes for many years. He speaks of the ease with which 800 bushels

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per acre can be produced from some varieties.

Sweet potatoes can be grown across the southeastern United States from Maryland to Texas. Assume that each of 12 southeastern states planted an average of 1,000,000 acres of sweet potatoes, producing 800 bushels per acre. (This is a reasonable assumption.) My friends that adds to 12 billion gallons of alcohol. The sweet potato crop alone could provide practically all of the alcohol needed to supply every automobile in America with gasohol.

If sweet potatoes were included in the legislation, I would suggest that the support price be 2¢ per pound with a resale to the alcohol producers at 1¼¢ per pound. If a farmer signed up for support price on his grain he could also get the support on the potatoes he grows provided he had a contract with an alcohol producer. This potato subsidy would cost the government less per gallon alcohol than the grain subsidy.

The innate instinct of the American farmer is to rise to and above any challenge that faces him. That he remains willing to keep on against even overwhelming odds is the one assurance that he will find a way to do what must be done.

That is the reason I have no skepticism about the future of a national gasohol program. Rather, I am so enthusiastic about what it promises for America's future that, with other family members, I am doing everything possible to become a producer of alcohol for fuel during the year 1980.

Because I have already felt the reaction of the financial community

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to private investment in alcohol plant construction, I support the provisions of Congressman Bedell's bill to lend assistance to those who would like to build distilleries. Most private financial institutions regard the process as a new industry, untried and unproven, and they are reluctant to risk the venture. They would like to see "somebody" do something about the energy crisis, but they want the "somebody" to be the Federal Government.

By making guaranteed loans available, subsidizing the purchase of feedstocks, and, making acreage available for crop production, HR 2153 will allow the establishment of the industry, and guarantee certain protection through the initial proving period. Once private investors observe the performance, and evaluate the returns, the need for federal assistance will be alleviated.

I urge the passage of H.R. 3905. Give the farmer an opportunity to grow all he can. Then, you best move back, as he will cover you up with food and fuel.

I can conclude this statement in no better way than to quote the closing sentences from am article by Walter J. Levy, the well known consultant on oil to industry and governments, in the current issue of Fortune Magazine. In "A Warning to the Oil Importing Nation," he makes our position startlingly clear: "The time available to us is short, if no already passed. The need for action is now, if not yesterday. Should we remain disunited or passive as well we might and thus inevitably fail, we have nobody but ourselves to blame."

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Prepared Statement of Eddie Condon, Barnum, Iowa

My Name is Eddie Condon. I'm from Barnum, Iowa; which is in Webster County just west of Fort Dodge..

I have lived in that area all my life except for two years in the army.

My wife Mary Catherine and I are the parents of seven children. We have two in college, two in high school, two in grade school and a pre-schooler.

I think I could classify myself as full time farmer most of my life. My father had poor health and I had to start working at a young age. I planted the corn when I was twelve years old, and operated the combine and corngicker when I was thirteen.

I farm 1400 acres; 700 acres of that I rent and the remaining 700acres has large annual payments due on it.

I also farrow and finish about 500 hogs a year. This has been a two man operation with maybe 200 hours of extra help at harvest time.

One of the terrifying things to me is that when I graduated from high school in 1951, seven families lived and provided a living for their families on the same land that I operate today.

Secretary of Agriculture Bob Bergland gave a speech to the Farmers Union last week, saying farm numbers have been cut in half since 1935. In my personal position, I have cut that by 16 years, or over 33% faster rate than the Secretary's report stated. In accord with his speech one-half of my land is rented from other landowners..

What would happen if all four of my sons wanted to farm? Where could we acquire another 1500 acres to farm? It would be impossible!

As Mr. Bergland said, if Something isn't done , where is it going to stop? Look at the trend of our cattle feeding lots with our meat packing plants. I visited the Iowa Beef Plant in Washington State last year and the huge cattle feeding lots in Arizona last August. It is very clear what is going on, and that is not going to reduce the price of meat.

I'm sure the rural cattle feeders who had to refinance or remortgage their farms the last three or four years just to stay in the business are very sympathetic with the consumer and the President who increased beef imports and slowed down expansion when they go to the meat counter today..I hope they've learned from this. Why is it our administrative advisors beleive that cheap corn will make cheap food? That is a myth that has been proven wrong. Look back four years ago corn was $3.00 and cattle under $40.00. Today, corn is $2.00 and cattle over $70.00.

I feel the government and the railroads have forced our Co-op elevators to merge and merge and merge, and the farmers rent the cars and build the tracts.

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In other words, we finance the railroads. The small independent elevators are gone out of business.

I visited with a chemical salesman recently, and he said he has one independent dealer left in the county. The implement dealer anticipates ten or twelve to sell machinery to in the county in another ten years.

How many more do we have to eliminate before we'll have price fixing?

I also feel they should abolish the position of Secretary of Agriculture, or else let him run his department. It doesn't seem to make a difference which party is in office_ they appoint a man with ability, ambition, new ideas, but then the administration tells him what he can do, may, and think. He is nothing but a figure head. He gets frustrated and either resigns or gets fired and that ends his political career.

I would like to call your attention to the shortcomings of our present Farm Program. It asks us to idle 10% of our land for a guaranteed price on corn that is less than the cost of production Isn't that great? If you don't farm 10% of your land they will guarantee you that you will lose money on the 90% that you do farm.

The improvement being this year that there is no amount of money for sure, but maybe you will get as much as last year..

I'm quite sure if I took a contract like that to my help, I would get told what to do with it. I can't guarantee you anything for sure, bat maybe you'll get as much as last year.

That is just the way I feel the farmers are going to accept this years Farm Program, I am very doubtful that 10% will participate fully in the program.

I have talked to only one person who said he was going in the program and when I asked why, he said, because they don't want us to .

Reasons for not going in the program are, first of all there is no Monetary reason to go in, and contrary to many peoples belief, farmers don't like to be paid for leaving their land lay idle. You never really leave it lay idle because you prepare a seed bed, seed it, mow it one or two times and plow it in the fall. Isn't that a waste of fuel and energy that is so scarce. The land isn't really idle, it is unproductive.

After raising the highest yielding corn crop I have ever raised last year, I received my index for this year only to discover they had been lowered three bushel an acre.

Farmers have to make such large payments on the land they are trying to buy,and they need full production. It doesn't take a mathematical genius to figure out that if you paid $2500 per acre, at 9½% interest that your interest, tax, and principal payments will be over $300 per acre. With an additional $130 production cost and 10% idle acres, you have to raise an excess of 230 bushel per acre to break even.

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With next March corn on the Chicago Board of Trade at $2.65 a farmer can hedge his crop for about $2.30net and put it all in production. Why would he idle 10% of it for a guarantee of $2.20?

The farmer doesn't worry that if we raise another 7billion bushel corn crop that corn might be $1.75 a year from now, because he has that farm payment to make this year, and if he doesn't make it, he won't be raising corn next year.

These are just some of the problems that keep the younger generation out of agriculture. It is just too much of a gamble, and they can't show their lender how they can justify a $25,000 tractor or $130 cash rent. They can't get financed for land purchases because land is to high, so they seek employment elsewhere.

The little farmer is gone and the big gets bigger.

What is going to happen to the most efficient producer in the world if they become huge cooperations, and have union labor and no incentive for the workers? The law of diminishing returns comes along here someplace.

Food is cheaper here in this great country than anyplace in the world. Lets keep it that way. Let us support family farms.

Now I would like to make a comment about Representative BurkleyBedells program for National Fuel Alcohol and Farm Commodity Production.

This is the most exciting government paper I have read since my discharge from the army. At a time when almost every taxpayer is thinking about California Proposition 13, how else could you take a tax dollar and stimulate so many different sectors of our economy?

Other farm bills I have read have been depressing because they were an attempt to save agriculture or tide it over.

This bill however would promote the construction and operation of privately owned alcohol fuel plants, create a significant outlet for surplus commodities, possibly bring an end to our surplus problem. It would increase domestic employment both through construction and operation.

Replace 600 million dollars worth of imported fuels and money spent here at home turns over many more times than it would had it been spent on imports. It would also be done from a source renewable annually.

It would make the United States more self sufficient of its fuel needs, and wouldn't it be possible if we were less dependent on imported fuels that the rate of inflation would be slowed down.

I believe this Bill has the possibilities of being looked back on this next century as being the most tax saving Bill introduced in Congress.

I vigorously support it and would urge everyone to push for its passage.

I would like to ask Mr. Bedell if the one cent a gallon tax is enough and how delivery points would be set up.

I thank you all for your time and appreciate the opportunity to serve on this panel.

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Lloyd Reeser - Chairman of Gasohol Committee, American Agriculture of Illinois

It is our privilege to present our views that encompass a broad spectrum of areas of national interest intertwined with ethanol to this joint hearing of the House Agricultural Sub-Committees.

We support the use of gasohol in the engines that move America, as well as Americans. New technology has greatly improved the efficiency of making high quality fuel ethanol from grains. New concepts involving waste heat and waste gasses to supply the energy used in producing ethanol are in the planning stage. New ideas of producing a high qual ty clean burning liquid fuel by blending our vast resources of high sulfur coal with renewable ethanol needs only pilot program funding to become a reality

It is extremely important and very costly to the nation to have people in responsible positions, both in and out of government, to continue to express antiquated ideas and data that retard the proper development of this Nation's food and energy resources.

We realize that problems do arise when a major change is made in the source of supply for a substantial portion of this Nation's energy needs. However, we are certain that the necessary expertise to resolve these problems is available, and in fact seeks only an opportunity to do so. When freed of unnecessary and often ridiculous government regulations and power centered vested interests, then the grass roots people of this Country will resolve these issues in a positive manner that is in the best interest of all 220 million Americans.

High protein food and feed is one of the by-products in the production of grain alcohol, and our food supply will not be jeopradized by producing alcohol from grains In fact with proper administration, it could well be enhanced. Food production will only be endangered when the price of whole grain gets so low that grain is competitively priced with other heat sources, and is burned for fuel. Corn has been precariously close to that point these past two winters.

Do we want a continued high inflation rate, and have government to continue to try to force earning down from the top with borrowed money? Or, do we want the economy stabilized by rewarding production, service and creativity at the grass root level allowing the economy to experience natural and real growth as these real earnings expand as they percolate up through the economy?

Do we want to continue to aggrivate our balance of trade by selling our food and energy to foreign countries at less than the cost of production while buying oil from foreign sources at excessively high prices, or do we want to exercise a fair and balanced trade program?

Do we want to continue to place our Nation's welfare and safety in jeopradv by being excessively dependent on foreign non-renewable oil, or do we want our welfare and safety secured by becoming energy independent with renewable energy resources?

Do we want to continue the policy of eliminating the world's most efficient food and energy producers - the American farmer - while food costs to the consumer keep going up, or do we want to allow the marketplace to reward that efficient producer at a price level that will keep him in business and at the same time to stabilize food costs?

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Do we want to continue to pollute the atmosphere of our many cities with automobile exhaust emissions from gasoline burning engines, or do we want to substantially reduce these poisonous emissions by using gasohol in our cars?

Do we want to continue to stand aloof of the world's plight of over 1,000,000,000 people being denied anything close to an adequate protein diet, or do we want to start to remedy this situation with productivity and technology now available?

Do we want to continue to let nature's forces erode our Nation's greatest natural resource - our soil, or do we want to implement the necessary steps that will keep this soil in place and productive of food and energy for generations to come?

The dedicated and innovative character of the American farmer has made him second to none in the efficiency of production of food for this Country, and much of the world. He now stands ready to produce a sizeable share of this Nation's energy needs and will do so when his talents, labor and investments are properly rewarded.

Seldom in history has man been afforded such an opportunity to resolve the many problems that confront him in a positive manner.

The choice is ours.

The time for obstructionists with vested interests has passed.

The time for positive action is NOW.

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News From NFO
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"FOR THE RECORD"

National Farmers Organization May 15, 1979

H.R. 3905

The National Alcohol Fuel and Farm Commodity Production Act of 1979 brings into focus substantive questions of national priority in the energy field and undertakes to relate the handling of ethanol production to the administration of a national farm program. Before going into a discussion of the proposed program, it is important to realize the effect of current daily announcements on fuel prices and availability.

The attitudes of our members range today someplace between frustration and distrust on the one hand -- and prayers and hopeful wishes on the other -- that the leadership of our government will select some attainable basic goals designed to overcome our deficiency in new sources of energy. It is clear to us that substantial efforts must be put in place and made productive if we are to modify the inflationary influences that effect all of our costs of production and our daily costs of living.

If I properly understand the expressions of concern coming from our people who are operating the producing farm and ranch units today, we are no longer willing to settle for more apologetic explanations on the part of elected leaders in the government and corporate officers of the major oil companies. We are not satisfied with the explanation that all the blame for our current plight should be placed on the leaders of the OPEC nations. Their course of action was to be expected. If they did not plan in their own economic interests after obtaining their educations in the best schools of the free world nations, it is a safe bet that American and European businessmen who stand to profit by increasing crude oil prices would have advocated and aided them in taking the very actions that were set in motion only a few years ago.

I believe that our people who live on and work the land may occasionally surprise the more erudite and articulate spokesmen representing other institutions and phases of business with their appraisal of what needs to be done as a matter of public policy. They understand very well that the major companies, jobbers, brokers, shippers and others who have very strong financial motivation to control oil, gas and coal from production through to

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the point of consumption, will continue to hold up the American public on prices so long as they are permitted to do so. The government apparently now is about to relinquish the last sadly administered and ineffective price controls that were originally intended to protect the consuming public. We have failed to develop coal or solar sources to take up the slack in supply of energy We have continued year after year to export our agricultural products at prices near or below the cost of production. We watch helplessly as other segments of the economy rig up subtle little trade barriers to protect some of our domestic industries and contribute to the inflationary pressures here at home All of this has occurred even as we have experienced a large imbalance in foreign trade and declining values of our money.

Our people have become sadly disillusioned and resentful. We want the overall direction of our government changed. We want to see new energy producing facilities both large and small, designed, built and put into operation. Many are convinced that there is an ample market for small applications at the farm and community level We are equally convinced that the technology is available to bring on line the necessary larger facilities needed to produce additional sources of power on a regional basis.

Within that general context, many of our people have consistently expressed support or sympathetic interest in gasahol development.

"The Brazil Experience"

It seems to be rather broadly accepted that total demand for liquid fuels will outdistance production by 1985. If severe conservation measures are applied, some new oil reserves are discovered and some of the demands for energy are satisfied by alternative sources not now in place, this deadline may be extended 10-15 years.

We are advised that Brazil, importing about 80% of its oil needs initiated its first serious efforts to produce alcohol as a fuel in World War II days. The program moved at a questionable pace until the mid-1960 s Since that time they have steadily increased production to a point where 6 to 10% of their national auto fuel needs may be satisfied from their own ethanol production

The Brazilians are reported to have over six million autos running on a mix of 85% gasoline and 15% ethyl alcohol. There is a large fleet of autos run on alcohol alone and it is a cleaner fuel than our own Over 840 million gallons of alcohol will be produced as fuel this year.

We cite this experience to develop views that may be appropriate in the current deliberations.

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In the first place, most of their early production efforts were concentrated in sugar production plants. In this approach, they succeeded in stabilizing to some extent, their sugar processing industry because the quantity of the production converted to alcohol varied in inverse proportions to the amount of sugar that could be placed in the world market at fair prices.

As their program progressed, they not only found that ethanol was quite acceptable when used in a mix with gasoline as a motor fuel -- they also discovered the importance of developing processes and sources that were less susceptible to annual fluctuations brought about by unrelated market activities. In their current program they are working with manioc which can be produced in poor soils but promises to be an acceptable feed stock because of its high starch content. They are also working with sweet sorghum, a palm nut type of production and a multiple use approach utilizing whole trees, rice hulls and coarse grain crop residues.

In this phase of the Brazilian program, they apparently have discovered the importance of decentralizing plant locations and developing several productive sources of mini-distillery capacity. Such an approach obviously reduces the cost of available raw material, facilitates the disposal of industrial waste derived in the processes and most important, it permits the development and operation of production units that can most efficiently utilize the type of raw material consistently at hand to support production. The precautionary conclusion seems quite obvious. We should avoid the development of large and expensive plants operable on only one source of feed stock.

Another aspect of dispersing production through widely spaced units that would use different grains, wood and waste products, appeals strongly to us for another reason that is not technical in nature. If an ethanol industry is to be developed in this country and serve the public well, we believe that it should be kept out of the hands of the major oil companies and similar corporate structures that are now in position to control production and pricing of most of our known available energy sources, namely the oil, gas and coal. We would like to see specific language in H.R. 3905 that would restrict the availability of any government subsidized feed stocks to alcohol producers that are independent of the corporations now producing or controlling the traditional sources of energy.

Farm Program Amendments

It must be noted that the proposal to establish an Alcohol Fuel Plant Loan Guarantee Fund in the Treasury of the United States and administer credit guarantees through the Secretary of Agriculture and the Commodity Credit Corporation, needs to be reconciled with the President's proposal to impose a windfall profits tax on

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the oil producers and establish an energy security trust fund to be used in developing alternative sources of energy. At this point in time we are unable to reach a firm conclusion as to which approach might best serve the farm segment of the economy, or whether both approaches may be used advantageously.

If we are to make a judgment, however, based on our recent experience, we must clearly favor an approach organized and handled through the Department of Agriculture as proposed in H.R. 3905.

This tentative conclusion leads us to express two reservations or precautions concerning the farm program modifications in H.R. 3905. As indicated informally at an earlier date, we believe it is of primary importance to be certa n that p ant capacity is in place to use the extra production before producers are encouraged by the government to plant for all-out production. Unless and until we can have more satisfactory pricing arrangements on the grains that are exported to the world market and more nearly profitable domestic prices we seem to have only one cho ce that will protect producers from economic ruin. That alternative is to reta n in the farm program a means of limiting production to the amount that may reasonab y be expected to return fair prices for our products. If we make a commitment now to give up this prospect in 1982 without knowing what our costs will be, we are again asking farmers to bear all the risks brought about by high interest rates and inflated costs of production.

The second point of major concern relates directly to the price support levels. We apparently will have continuing inflation in our costs. The $2.10 loan rate and the $2.75 target price for corn with related rates for other grains, obviously will not assure the survival of family-sized farming units and we cannot now make commitments to accept that arrangement on crops to be planted three years hence.

Said another way, the bill calls for producers to commit 10% of their all-out production to the Secretary at the target price level. With overproduction, it would be obvious that the market would range at or slightly below the loan rate level. Our producers would be 'locked in' on an arrangement to support gasahol production. We simply cannot rely upon the willingness of an unknown Administration to use the permissive authority to establish more favorable rates. We believe both the loan and target price rates must be geared more specifically to the actual costs of producing the grains.

In conclusion, we are pleased that Congressman Bedell has taken the initiative to develop H.R. 3905 and help move the country one step closer to utilization of surplus grains in meeting our fuel requirements in the future. A continuing dialogue based on the provisions of this bill and the pilot projects authorized by current legislation may contribute to the establishment of a national ethanol production plan. In that plan we hope to utilize excess grain along with other feed stocks from agriculture in a consistent or stable system of production.

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STATEMENT OF THE

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS

ON

GASOHOL FUELS

TO THE

SUBCOMMITTEE ON CONSERVATION AND CREDIT
&
SUBCOMMITTEE ON DEPARTMENT INVESTIGATIONS, OVERSIGHT, AND RESEARCH
&
SUBCOMMITTEE ON LIVESTOCK AND GRAINS

COMMITTEE ON AGRICULTURE

U.S. HOUSE OF REPRESENTATIVES

May 15, 1979

The National Society of Professional Engineers appreciates this opportunity to present its views on the greater utilization of gasohol. The National Society of Professional Engineers is a nonprofit organization which consists of nearly 80,000 individual members representing virtually every aspect of the engineering profession.

Engineers are vitally concerned with the creation of "new" fuels for the American automobile to fill the gap increasingly left by gasoline. Alternative fuels have been used in other countries for as long as thirty years. The materials are at hand. What is needed are effective incentives for engineers and others to perfect the technolgoies needed for the transformation to gasohol.

Methanol is the most common of gasohol fuels. There are many sources for methanol, the most prominent of which are: wood, biomass from forest and farm wastes, coal seam methane, and agricultural crops such as cattails, sugarcane and corn. These sources are prominent in various areas of the country; Minnesota produces 30 tons per acre per year of cattails, Hawaii 26 tons per acre per year of sugarcane, and Georgia 7 tons per acre per year of silage corn.

Besides being readily available, methanol is more efficient than gasoline. The octane rating for methanol is between 106-114, compared to gasoline's 85-95. When blended with gasoline in small quantities, the methanol increases the octane rating considerably more than the proportion added.

There are many ways to adopt the automobile to use methanol. One problem is that methanol vaporizes more slowly than gasoline and sometimes causes difficulties with starting cars in cold weather. This problem can be solved, however, by installing a dual fuel carburetor or by recovering and recycling exhaust heat. Ironically, many early American cars were equipped with a carburetor heater and dual fuel piping for alcohol and gasoline.

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A car operated on pure methanol would require a fuel tank almost twice as large as a conventional car. However, the increased weight would be conterbalanced by the smaller engine required by methanol fuel which produces more power.

The use of gasohol opens up an entire new area of innovation and productivity for the engineer. General Electric has run tests in a combustion chamber which have proven that methanol is an excellent turbine fuel. These tests have also shown that methanol leaves no metallic deposits and produces three to four times more power between overhauls than originally expected.

Similarly, Volkswagen has discovered that at a compression ratio of 8.2 at 2,000 RPM, methanol shows a 5 to 12 percent improvement in thermal efficiency, and 12 percent more power than gasoline.

The economics of methanol power is also appealing. A 1976 study indicated that a gallon of methanol cost the equivalent of $1.00 - $1.10 of gasoline. With those prices and prices even higher becoming a reality to Americans more each day, the methanol becomes more attractive.

There is another reason beyond the economic and technological promises for the need to utilize methanol and other gasohol fuels. Americans are seeing their hard earned money being swallowed by almost uncontrollable inflation -- inflation caused mainly by a large foreign oil trade deficit. It would be economically disasterous and totally impractical to attempt to wean American consumers from their cars. The remedy therefore, is a domestically produced, renewable resource to fuel our cars.

NSPE believes that it is well within the capabilities of the engineering sector to produce designs for gasohol cars and design plants on the small and large scale which will produce this gasohol. We can and must produce domestic fuel sources.

We thank you for this opportunity to address the gasohol issue and would be pleased to help the Subcommittee in this matter.

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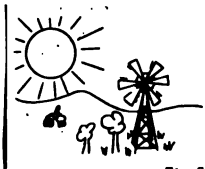

SMALL FARM ENERGY PROJECT

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May 11, 1979

Tim Galvin, Assistant
Congressman Berkley Bedell
House of Representatives
316 Cannon House Office Bldg.
Washington, D.C. 20515

Dear Mr. Galvin:

Thank you for sending to me a copy of HR 3905, the "National Alcohol Fuel and Farm Commodity Production Act of 1979", as introduced by Congressman Bedell. I am responding with this letter, which will serve as my written testimony on the bill.

At the Energy Project, we are particularly concerned about the potential damage to the soil by further production levels that would be geared to fuel production. Present soil erosion is averaging nine tons per acre annually from U.S farms, according to a recent Des Moines Register study. The study also indicated that new topsoil forms only at the rate of about four tons per acre each year, less than half the erosion rate. It is apparant that more extensive measures of soil conservation may be needed before farmers begin producing crops for alcohol production. Crop residue may eventually be used for fuel production, which could make the situation even worse. Marginal land, the most prone to soil erosion and nutrient depletion, would be the first land to be added to crop production for alcohol plants. However, considerable energy may be required for that land in the form of fertilizer inputs. And as soils continue to erode, progressively more fertility may be required, all to the detriment of any positive net energy output that the soil may provide today.

The legislation in question addresses the potential of fuel crops converted to alcohol for the gasohol industry. Small farm plants are essentially ignored, although they may have many economies not available to the large plants. For on-farm plants, no transport is required for grain to distant alcohol facilities. The protein by-product does not have to be dried at the farm level, and be used in wet form in livestock production. Fuel produced can be used directly on the farm in gasoline engins s at a lower quality than required for the gasohol program. There are other advantages as well.

Dr. Paul Middaugh of So. Dakota State U. is corrently conduding research on the potential of on-farm alcohol production and he is well acquainted with the benefits of small systems compared to large systems. Dr Middaugh has had much experience in the area of alcohol production. would suggest that small systems should be considered, before a major commitment is made to develop large scale alcohol production systems, that may well have lower feasibility than farm plants. Small plants would undoubtedly have a much shorter lead-time in construction than larger, more costly plants.

(continued)

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William Holmberg, Director of Public Participation at the Dept. of Energy, reports in the recent issue of Biotimes, "Near-term projections for alcohol fuels indicate a production capability considerably less than the currently estimated farm need of 2.5% of the nation's liquid and gaseous fuels. Should we not address the question of encouraging, through the use of tax credits, tax exemptions, and entitlements, the use of 100% alcohol fuels on the farm, in farming operations, and in the farm community?"

The Center for Rural Affairs which sponsors the Energy Project has been concerned about the future viability of small farms in the face of rising farm costs and continued pressures by larger farms and agribusiness. Small, limited resource farmers may particularly need special assistance to benefit from alcohol fuel production, especially at the farm level. We understand that President Carter has announced a proposal that would fund up to 100 small farm-scale alcohol plants. This may be a step in the right direction from previous support of large scale plants, but it may ignore small farmers. Small farmers will likely need additional support to remain viable. The Center for the Biology of Natural Systems - in a recent report suggests that proper design for small scale systems should take into account the limited time farmers have available for operating farm plants, the use of farm-produced energy inputs for the systems, and the cost savings which would be available by the use of locally purchased construction materials. Farmers would also benefit from further development of processes to best utilize the farm produced fuel in tractors, particularly in the popular diesel engines, most of which cannot utilize ethanol as a fuel alone.

Relaxation of government regulation would also pave the way for smaller farmers to utilize the technologies of alcohol fuels.

I hope that your office can enter my comments into consideration with regard to HR 3905 and other alcohol fuel legislation. Thank you.

Sincerely,

Dennis Demmel

Dennis Demmel

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